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SYMPOSIUM ON TONSIL SURGERY.

I.—HEMORRHAGE FROM PHARYNGEAL AND PERITONSILLAR ABSCESS.*

DR. SAMUEL SALINGER, Chicago.

This is a resumé of a critical study of 227 cases taken from the literature, including ten previously unreported. The group includes hemorrhage from retropharyngeal, peritonsillar abscess, also parapharyngeal and cervical cellulitis; in short, hemorrhage from nose, throat, ear or neck complicating or arising as a result of infection in the throat.

The anatomical points brought out are lymphatic and blood distributions in the peritonsillar and parapharyngeal abscess with particular emphasis on the proximity of the internal carotid artery to the lateral pharyngeal wall. Attention is called to anomalies of the internal carotid, such as tortuosities, loops and aneurysm, all of which tend to bring the vessel close to the structures especially involved in throat infections.

Analysis of hemorrhages by groups, based on location of the infection, yielded the following figures:

*Abstract of paper read as part of a symposium before the Joint Session of Sections on Pediatrics and Otolaryngology, New York Academy of Medicine, Feb. 21, 1934.

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Peritonsillar Abscess: Eighty-five cases—Ligation external carotid, 11; recovered, 8; mortality, 37.5 per cent. Ligation common carotid, 17; recovered, 15; mortality, 13.3 per cent. Cases not ligated, 58; recovered, 29; mortality, 50 per cent.

Peritonsillar Complicated by Parapharyngeal: Thirty-one cases—Ligation external carotid, four; recovered, three; mortality, 25 per cent. Ligation common carotid, six; recovered, five; mortality, 16.7 per cent. Cases not ligated, 21; recovered, four; mortality, 80 per cent.

Retropharyngeal Abscess: Thirty-two cases—Ligation external carotid, two; recovered, none; mortality, 100 per cent. Ligation common carotid, five; recovered, three; mortality, 40 per cent. Cases not ligated, 25; recovered, one; mortality, 96 per cent.

Retropharyngeal Complicated by Parapharyngeal: Twenty-eight cases—Ligation external carotid, one; recovered, none; mortality, 100 per cent. Ligation common carotid, 14; recovered, eight; mortality, 35 per cent. Cases not ligated, 13; recovered, none; mortality, 100 per cent.

Parapharyngeal Abscess: Twenty-one cases—Ligation external carotid, one; recovered, one; mortality, none. Ligation common carotid, seven; recovered, three; mortality, 57 per cent. Cases not ligated, 13; recovered, one; mortality, 80 per cent.

Cervical Abscess: Thirty cases—Mostly post scarlatinal cellulitis with sloughing in the neck. Ligation common carotid, five; recovered, two; mortality, 60 per cent. Surgical exposures and autopsies in remainder disclosed source of hemorrhage to be internal jugular.

Totals for All Groups: Cases not ligated, 154; recovered, 36; mortality, 77 per cent. Cases ligated, 72; recovered, 47; mortality, 35 per cent.

Autopsy reports of 90 cases show erosion of internal carotid 49 times (17 with false aneurysm), erosion external carotid four times, common carotid nine times, and other vessels 14. Omitting the jugular hemorrhages, which belong in a class by themselves, there were 76 deaths due to erosion of arteries. Grouping erosions of the internal and common carotid arteries

we find a total of 58 deaths which could only have been prevented by ligation of the common carotid artery and leaving only 18 cases where the hemorrhage might have been stopped by ligation of the external carotid.

In the entire series of 227 cases there were 85 where only one hemorrhage was recorded; only eight of these recovered spontaneously. Twenty-four cases were immediately ligated and 14 survived.

Spontaneous hemorrhage from the ear was found to be a grave symptom. It was present in 20 cases, only four of which survived. Autopsy reports in every instance disclosed a false aneurysm of the internal carotid artery. This symptom, therefore, is of gravest importance and should be an indication for immediate ligation of the common carotid.

Recurrent hemorrhages may be classed in the following groups:

1. Several minor prodromal hemorrhages followed by a foudroyant, often fatal hemorrhage indicates false aneurysm usually of the internal carotid and should be treated by ligation of the common carotid.

2. Several hemorrhages in succession may arise from branches of the external carotid or from the internal carotid itself. Diagnosis will depend on presence of parapharyngeal involvement or a false aneurysm. If patient's condition will permit the carotid sheath may be opened and a search made for the affected vessel. Unless successful, one would have to ligate the common carotid lest valuable time be lost and the patient's life be imperiled.

3. Recurring slight hemorrhages due to local vessels of the tonsil bed or the palate. In the absence of parapharyngeal symptoms, palliative measures may be employed up to removal of the tonsil and ligation of bleeding points thus made accessible.

The dangerous cases are those in which one or more of the following factors are present:

1. Spontaneous hemorrhage so severe as obviously not arising from a minor vessel.

2. A protracted course in which the swelling fails to disappear following previous incision.

3. Hematoma of the surroundings as evidenced by sub-mucous discoloration or tense brawny swelling.

4. Increasing pain, swelling locally and in the neck and trismus despite incision of the abscess and long after the course of a normal peritonsillar abscess has been run.

5. The presence of pulsation in the peritonsillar area.

Ligation of the common carotid artery is discussed fully on the basis of world-wide statistics. In the main they demonstrate that in 25 per cent of the cases serious brain complications follow common carotid ligation, half of which end fatally. The percentages are higher in adults than in children. Total mortality following ligation is due not only to brain complications, but also to sepsis, anemia and other conditions inherent in the disease and therefore not truly attributable to the ligation itself.

In considering the dangers of such ligation one must not lose sight of the fact that the tables above presented demonstrate the extremely high mortality in cases not ligated and that, therefore, when a patient's life is at stake one must run the risks attending ligation of the common carotid as the lesser of two evils. These dangers may be to some extent mitigated by simultaneous ligation of the internal jugular vein followed by a blood transfusion.

25 East Washington.

SYMPOSIUM ON TONSIL SURGERY.

II.—PROGRESS IN TONSIL SURGERY, ILLUSTRATED BY SLIDES AND MOTION PICTURES, WITH A BACKGROUND OF 25,000 CASES.*

DR. ROBERT H. FOWLER, New York.

The first 25,000 operations at the Tonsil Hospital were done since 1921 by 50 surgeons on the attending and interne staff in a ward devoted to the care of children under 14. It has been my job to do 1500 of these operations myself, to teach the internes their work and to do the research. All this has developed a new viewpoint.

I wish to present to you first some charming little neighbors of mine, these two children, who are twins, Johann and Carl. Johann, as you see, had his tonsils removed a year ago. Since then he has gained a pound and a half over the other in their race so far, and has shown manifest change in disposition. The second one, Carl, has now developed trouble with his throat and ear so that his mother is anxious to have him operated on. This fits into my plan to use these twins for research. In the first year Carl has been an accurate control; now it will be his brother's turn to act as control and a year or two from now perhaps I can bring them back for your further study, at which time we may be able to see that the second child has caught up somewhat. This is all on the supposition that the infected tonsils and adenoids have been acting as a handicap.

THE NEW CONCEPTION OF THE TONSIL AND THE EVOLUTION IN ITS TREATMENT.

At the turn of the century when tonsillectomies were done the objective was to get out what was regarded as the center or bulk of infection. By the close of the war this was seen to be not enough. The need was recognized for getting out

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the whole tonsil, but with it came some of the throat. Today in our modern practice the purpose is to get the whole tonsil out but to leave the throat whole, for *that* is the thing we must conserve.

While there has been this progress in the operation itself, there has been an equal change in the attitude taken towards it.

The rise of the practical tonsil operation dates back to the discovery of anesthesia less than a century ago, but the spread of its popularity recently is due to the realization that it is the site of infection. There were years when it took on the characteristics of a fad. There have been too many tonsil operations performed on those who did not need it and too few performed on those who did, and there is no health in us.

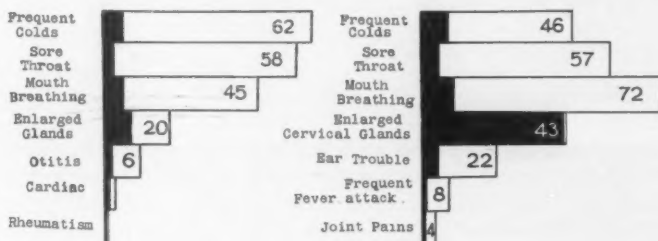
We are today laboring under the criticism brought on by the overhang of wrong and sloppy operations which have raised a question among medical men in general as to the value of removal. But meanwhile there has come an advance in technique among a few laryngologists who are leaders in this matter and who are particularly interested. They have set standards to which the entire group of laryngologists must be brought if we are to overcome the natural recoil at the earlier and cruder methods.

You will realize this more clearly if you will follow me on the developments that have taken place at the Tonsil Hospital in 62nd Street. It will afford a good illustration of this difference between routine handling of a large number of cases of one type and using the opportunity to advance the cause by treating each case not as routine, but by analyzing it with a view to working out a generally improved method.

This hospital was started soon after the war, at a time when there were only 45,000 beds available and a need for 65,000. In the 12 years since there has always been a great demand for this operation.

The value of the tonsil operation is estimated by the public and general medical men on the basis of facts rather than on the basis of anyone's opinion, and the facts of the case will be shown better by follow-up reports than by any other means.

It will be easier for you with these twins in mind to visualize the significance of statistics in larger groups. From them you can see that the only part of their gain that goes into the statistics is the extra pound and a half in weight, but the part which does not go into the statistics in their case is that the mother says there is a great improvement in disposition, and you have noticed that one runs up the aisle quicker than the other. You may even have noticed that the second twin, who needs operation, has a bit of cotton in his ear. All in all, these children are a very typical and appealing presentation. The gain in weight is characteristic of what has recently been reported in England as following tonsillectomy. The author of the paper reporting gain in weight as characteristic reached the conclusion that that was one of the signs of progress in the child. Another thing he concluded, upon what basis I cannot quite figure, was that one-third of the children in the public schools in England should have their tonsils out. It is very difficult to draw a conclusion like that; undoubtedly he had some reasons for it.



The follow-up reports on tonsil operations showed considerable advancement when Dr. Kaiser, of Rochester, wrote the first of his reports on 5,000 cases operated at the Eastman Clinic. He devised such an improved method of graphic presentation of results that if we were to get the most out of our records in the children's ward, it was obviously well for us to use his system. This makes possible the comparison of 1200 follow-ups from the Tonsil Hospital, with 5,000 from Rochester. When Lewinski-Corwin, who wrote a report for the Committee from the Academy of Medicine on "The Tonsil

Question in New York" in 1921, saw this particular chart, he said: "All pediatricians will be interested in this; its main feature is the improvement in *the first three conditions*, sore throat, mouth breathing and frequent colds. *These three are the underlying conditions* of ill health in childhood."

Under the group marked "enlarged cervical glands," there was a difference in our results. Dr. Kaiser is a very fair, open-minded investigator and takes suggestions in a very kindly manner; he is not a throat surgeon, but a general practitioner. That contributes to the value of his findings. He found only 4 per cent of their cases were getting clear of the cervical adenitis. That puzzled me a great deal because here in New York we had apparently been getting 70 per cent cleared up. This difference required a special investigation and some letters to Dr. Kaiser with the suggestion that perhaps it was the removal of the last bit of tonsil at the base that made the difference in these cases. From his later reports I gather that they have checked up on this particular phase of these tonsillectomies and now their reports are running parallel to ours. I think this shows the value of these follow-up studies and also that we are coming to a friendly basis where the pediatrician and general practitioner can help improve the value of our work.

From time to time a new group of cases which have been accumulating can be reported. To meet the number of cases reported tonight by Dr. Mason, we looked also for a hundred for my paper, and in seeking those that would be most interesting we chose cases in which the children had had *heart murmurs*. The first thing that surprised us was that almost all of these cases came back when summoned. Apparently the parents in cardiac cases are more interested in the follow-up examinations than the average.

The interne reported 95 children had no murmurs, one to three years after operation; five had the murmurs unchanged, and I personally checked up on 40 of these cases in which I was very much surprised to find that 95 per cent appeared so much improved. The pediatrician may have a more definite impression than the throat surgeon as to how many children recorded as having heart murmurs on the first examination in the hospital would be apt to show no murmur within three years if no operation were done. A few might

outgrow their trouble; in a few the further growth of the body and general development may bring relief, but to me it was astonishing, something unexpected which apparently had not been fully reported on before, to find in a group running into three figures that only one in 20 retained a murmur one to three years after their tonsils and adenoids were removed. I confess having been so skeptical that I went over many of the cases with a stethoscope to corroborate the present follow-up examination, although unfortunately I could not go back to corroborate the reports of the internes who on different occasions stated they heard definite murmurs before operation.

Fifty Rheumatic Cases: Ten children that had "acute articular rheumatism" when they originally came to the hospital showed no particular change after tonsil and adenoid operation. The remaining 40 listed under rheumatism had as a chief symptom "growing pains" and these pains disappeared in all forty cases.

To summarize the findings reported today by the interne of the Tonsil Hospital on 150 recent follow-ups:

1. Ninety-five out of 100 cardiac murmurs cleared up after operation.
2. Ten acute articular rheumatism cases showed no change after tonsil and adenoid operations.
3. In 40 children "growing pains" disappeared after operation.

These are the facts; I leave to you the task of estimating their significance.

With regard to the 25,000 cases, it is interesting to note that in all, there were four fatalities in the ward within 12 hours of operation. In addition, three fatalities should be noted—one of diphtheria, one of phlebitis and one of infantile paralysis, in each case complicated by tonsillectomy six weeks earlier. There is an absence of pulmonary abscess in this list, perhaps due to the fact that the patient's head is held low during operation. Serious complications that were followed by recovery included two mastoids, three hemophiliac cases and half a dozen patients who needed transfusion after hemorrhage.

Now I have given you a sample of follow-up reports and I want to give you a sample of research, intended to improve the operation. My idea is that the narrower your specialty the broader must be your point of view; the smaller your field the more you have to know about it. Several years in research, not a blind seeking after what was unknown, but a definite hunt for an explanation of something we all see every day, have yielded information that will help in the operating room.

What is the tonsil?

The human tonsil is a *lymph-lined pocket in the wall of the throat prone to infection.*

What is the tonsil operation?

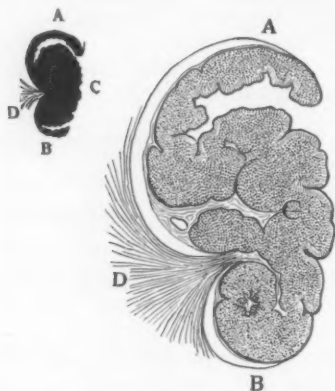


Fig. 1. Diagram of tonsil showing: A, hoodlike upper lobe; B, pocket-like lower lobe; C, lymphoid mass; D, muscle attaching to capsule at equator.

Its purpose is not merely to remove a source of infection, but to conserve the throat.

A pocket, prone to infection. This is not what we have been taught. We were taught that the tonsil is a convex mass, spherical or egg-shaped, and partly encased in a capsule which is easily detached from the wall of the throat. You can see in this diagram how this description gained credence, for there is a massing of the loose lymphoid material in the lower part

of the whole pocket which makes up the tonsil; however, instead of being altogether convex the exposed surface is concave, at least in the upper part, and that is important. The lumen corresponds to the lumen of the appendix. The open space in the upper part of the tonsil dates back to the embryo;



if, as I think, this pocket is the essential feature, it would be no more fair to overlook it than to overlook the hole in the doughnut.

Now let us study the reverse side of the tonsil. Instead of having a capsule, as we have been taught, it is bound directly

to the adjacent muscles. The tonsil and the muscles are interwoven. What the surgeon really does is to strip or split away from the wall of the throat a single layer of the pharyngeal fascia. This sheath of white cobweb-fibers is really borrowed from the muscles and merely looks like a capsule enveloping the tonsil after it has been removed. It is an artefact especially accentuated by the use of formalin afterward.

"But," you will say, "*what authority have we in asserting that the tonsil is a pocket and has no actual capsule?*" Here comes the interesting part of my paper.

In 1902, Hammar, an embryologist in Sweden, read a paper, "*Über der Entwicklung des Vorderdarms,*" or "Studies of the

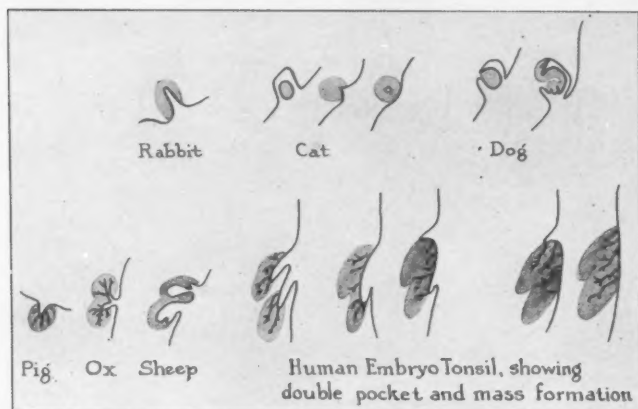


Fig 4. Cross Sections (Hammar).

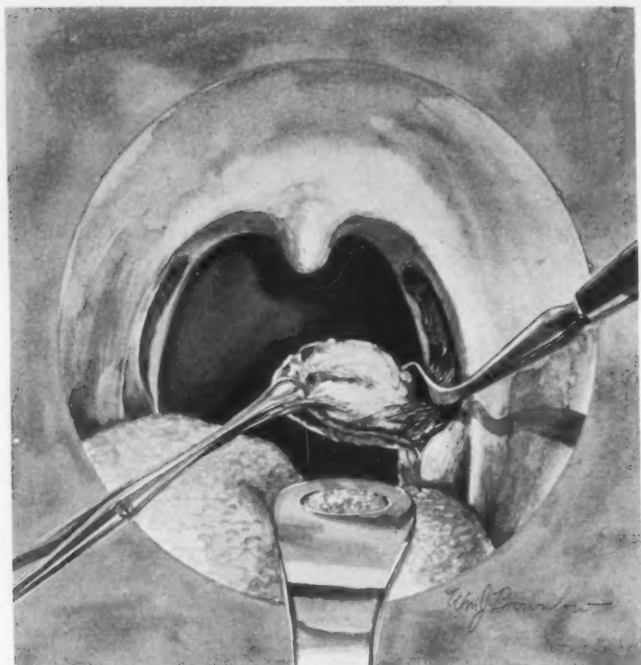
Development of the Fore-gut." He described the tonsil, looking at it as an embryologist, as a superficial pocket in the fore-gut. The slide shows a picture from that article. The picture on the left shows the tonsil in the embryo in the ninth month, illustrating its pocket formation and suggesting the mass in the lower part of the pocket. You can see this shadowy suggestion of the upper and lower lobes separated by this hour-glass constriction. I think that is the first description of the tonsil regarded that was as a double pocket. In

1910, in England, Hett and Butterfield wrote a paper on the "Anatomy of the Palatine Tonsil," in which they gave an analysis of it in the vertebrates "In the Persian leopard and in the cat the tonsil is a single pocket like the appendix (the upper picture shows the tonsil of the Persian leopard looking like the appendix); that of the agile gibbon is a double pocket, and the tonsil of the badger is a double pocket with a ridge between. These are all shown in this slide. The dog has a tonsil made up of a pocket largely filled with lymphoid tissue forming a mass. I have spoken of the findings in 1902 by Hammar and in 1910 by Hett and Butterfield, and here, in the "Rosetta Stone" of the subject, this slide, you see the cross section of these tonsils in the various vertebrates, the straight simple tube in the rabbit and cat, and the pocket with its mass found in the dog. Below that is the sheep with a double pocket and a mass in the center. The human embryo is shown by Hammar to have a similar picture at the different periods of development. In its first stages the tonsil of the human embryo appears as a simple ridge, a simple fold of the mucous membrane, then as a double pocket, and in the nine months' fetus it is a double pocket containing a mass. I need not point out to you that this is a most interesting case of phylogenesis, running curiously true to the laws of evolution, that ontogeny repeats the phylogeny. The story of the individual development is an epitome of the ancestral transmutations. (The fundamentalists will not admit that, but the rest of you will.)

Now let us return to the practical field of improvement in tonsil surgery, treasuring from this just one pearl of information, that when these two pockets in the embryo coalesce, they catch between them and entangle part of the adjacent vertical muscle of the pharynx. That is proven in the operating room. The next slide shows my own drawing of a tonsil which I called after Mae West, but this shows more than the average stream-lining. It is an unusual child's tonsil with almost total separation of the pockets in which the embryonic form described by Hammar had persisted past its time.

But it is not easy for those who have lacked time for study of the embryology to conceive of the tonsil as anything but a simple egg-shaped mass with a protecting fibrous capsule like the capsule of the kidney.

For years my respect and affection has prevented me from arguing with a friend who in the operating room says, "You are all wrong. The tonsil has no waistline. Watch me draw down my snare slowly over the upper pole and you will see that it is spherical, like a golf ball." You know what he means; he manufactures golf balls.



So, realizing the difficulty of getting people to change their minds I said to my partner in the research, Prof. T. Wingate Todd, of the Anatomy Department of the Western Reserve University, "How will you get them to believe?" He said, as a true scientist, "I find my facts; then I go before them (he was speaking of the anatomists); I say *it is so, it is so, it is so!*" I do not dare to be so emphatic; I have not the Jehovah complex.

The next slide shows a drawing with different colors which he sent to me a month or so later. Anyone can see that it is a pocket and that it has a muscular attachment, so I wrote, "That is the thing we have been looking for. Now they will believe." He answered, again the true scientist, "Don't be too sure. It takes time to educate."

One more slide before showing the movies shows the tonsil, its attachments and the razor blade edge of the dissection teasing off that muscle before the snare is put on.

153 East 62nd Street.

SYMPOSIUM ON TONSIL SURGERY.

III.—RESULTS OF TONSILLECTOMY IN PRIVATE PRACTICE.

DR. M. H. BASS, New York.

When I was asked to report on the results of tonsillectomy it at first seemed to me to be a rather futile duty, so much has been written on this subject and so many statistical results have been published, that my report would only seem to add another to an already long list. However, on more mature consideration I thought that a purely personal evaluation of the result of tonsillectomy on private patients whom I had known both before and after operation, and whom I had followed for years might really be of interest. The report that I am making tonight must therefore be considered as a purely personal communication. I have purposely refrained from citing the results of others or of quoting the literature on the subject. This report covers only patients seen in private practice and deals almost without exception with children with whom I am familiar and whose medical careers I have followed for many years.

I drew up a questionnaire which I submitted to the parent of each of these children personally. The questionnaire was not sent by mail and the answers to the questions were given in my presence, so that any doubtful points might be discussed.

In all, 150 children are being reported on. I realize that this is a small number from which to draw conclusions, but the paucity in numbers is, I think, made up for by the fact that these cases have been very closely followed and that in the great majority of instances it was I, myself, who decided on the indication for operation. I might also add that in almost every case the operator was a highly qualified specialist and that the anesthetist, hospitalization, nursing and medical care were the very best that one could obtain. The final results

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are therefore those which should be obtained when tonsillectomy is performed under the most ideal circumstances.

First, as to the general result. This I thought would be best answered by asking the last question on the questionnaire, namely: "In your opinion did the result justify your having the child operated upon?" The answer to this was "Yes" in 133 cases, "No" in ten cases, "Questionable" in seven cases. In other words, 88.6 per cent of 150 children operated upon were benefited by the procedure.

Of the ten failures, seven gave as the chief cause for operation, repeated colds, one anorexia and poor breathing, and one rheumatism and frequent colds; one unexplained fever.

Of the total 150 cases the following is the list of chief indication for operation: Colds, 64; tonsillitis, 39; vomiting, 3; sinusitis, 2; cervical adenitis, 11; rheumatism, 2; anorexia, 8; nasal obstruction, 52; otitis, 18; pyelitis, 3; unexplained fever, 2; croup, 1; deafness, 1.

I do not wish to burden you with too many figures, but would merely say that the best results were obtained in cases of repeated tonsillitis or sore throat, in cervical adenitis and in otitis media.

Among the total number of cases, 40 children gave a history of otitis media. These cases were distributed as follows:

Otitis Media: Forty cases gave a history of otitis; 32 had otitis before and not after operation; 4 had otitis both before and after operation; 4 had otitis after but not before operation.

There is a general feeling among some otologists that operation on tonsils and adenoids does not prevent otitis. However, this small group of patients seems to show that many more children suffered from ear trouble before their tonsils had been removed than afterwards.

As regards sinusitis, there were 17 children who gave a history of sinus involvement. Nine had sinusitis before tonsillectomy, but not after; 5 had sinusitis both before and after tonsillectomy; 3 had sinusitis after but not before tonsillectomy.

The figures I have concerning nose colds show that operation is not of much benefit. Many patients, however, mention

that colds are less severe, or that the children breathe better during their colds. The number of colds does not seem to have been influenced by operation. These results are in agreement with Kaiser's findings. He points out that 40 to 60 per cent of preschool children have three or more colds a year. They become less frequent after any child reaches the age of six to ten years. Careful selection of cases may improve the operative results.

In this group of 150 children, ten gave a history of joint pains. Of these only three were improved by operation, the remaining seven either developed severe rheumatic symptoms several years after the operation or continued to have fleeting joint pains. As you know, rheumatic endocarditis is a very rare disease among better class patients. It is therefore of interest to note that of the three children in my practice developing permanent endocarditis, all three had had tonsils previously removed.

In this group of cases there was only a single case in which real postoperative difficulty was encountered. This was a child of three years who was operated upon in May. She had suffered from cervical adenitis and continued fever. She had never had otitis. Immediately following operation she developed bilateral purulent otitis with high temperature. This continued for two weeks and although she just escaped operative mastoiditis, entirely recovered.

Even where cases are carefully selected and thoroughly examined, unpleasant sequelae may follow operation. In my own practice, excluding these 150 cases I have met with the following difficulties:

1. A girl, age 5 years, afebrile, was operated upon in June. Immediately following operation she ran an unexplained fever for five weeks and then recovered. Tuberculin and Widal tests were negative. Blood count and repeated urine examinations showed no abnormality. She was examined by several physicians, none of whom could explain the fever except as a direct result of operation on infected tonsils.

2. A girl, age 6 years, operated upon in July. Operation performed by an exceptionally good surgeon; general anesthesia, by one of our best anesthetists. A large lung abscess developed, necessitating thoracic operation and transfusion. Recovered.

3. A girl, age 8 years, operated upon in December. No previous ear trouble. Developed otitis media after operation which went on to operative mastoiditis. Recovery.

4. A girl, age 12 years, was operated upon in late November in New York City. She developed fever and severe cough immediately after operation. Physical examination was negative, but an X-ray showed this interesting finding: (Here lantern slides were shown demonstrating a putrid necrosis of the lung.) No incubation period. No fetor ex ore. Recovery.

I have purposely mentioned the months when these children were operated upon, for I do not think that the question has been settled as to whether tonsillectomy should be performed in the winter months. I hope that someone will discuss this question, as it is one of great importance. My own opinion is the following: I think that as a matter of choice the operation should not be performed during the cold months of the year when nasopharyngeal infections are so prevalent. However, when I encounter a case where I believe the indication for operation is urgent, I have the child operated upon at home. The child is kept in his bed for five or six days and then allowed up in his room. He is not allowed to go out until he has entirely recovered. I have never had any difficulty when I followed this procedure and feel that tonsillectomy can and should be performed in the patient's home.

In my series of 150 cases, six cases required a second operation. One had had adenoidectomy only in infancy and had both tonsils and adenoids removed several years later. In the other five, adenoid tissue had recurred. Here let me say that I have purposely refrained from reoperating recurring adenoids if these are accompanied by such hypertrophied lymphoid tissue. In such cases I have had excellent results by using X-ray treatment of the throat.

In conclusion, I would say that a careful analysis shows that of 150 children in private practice, where the greatest care was exercised in indication of operation and choice of operator, the child was distinctly benefited in 88 per cent of the cases.

There is no question that even under these ideal conditions, accidents and serious sequelae may occur, but I still believe that with proper indication tonsillectomy is a useful and necessary operation.

1097 Park Avenue.

SYMPOSIUM ON TONSIL SURGERY.

IV.—PERSONAL OBSERVATIONS ON THE AFTER-EFFECTS OF TONSILLECTOMY.*

DR. HOWARD H. MASON, New York.

The basis of my report is an analysis of the histories of 84 patients whom I have followed in private practice. The chief advantage of such a study is that many of the patients have been observed over comparatively long periods by the same person. The cases were not selected except for two of the rheumatics. In most instances a questionnaire was filled out by the patient's mother and her answers were checked with the history notes. A few reports were made up entirely from the history notes.

The first question is, did the operation help?

Regarding *otitis*, of the 37 patients who had otitis before operation, 22 have not had otitis and 14 have had otitis since the operation. One patient, who had not had otitis before, has had otitis since the operation. These figures are certainly in favor of early operation, but one must remember that the adenoids were removed as well as the tonsils. I cannot help wondering whether removal of the adenoids only would not have produced the same results.

Mastoid: Six patients have had mastoid operations, three before and three after tonsillectomy.

Frequent Colds: Sixty-six patients had frequent colds before operation. There is no evidence in my reports or history notes that these patients had fewer colds after operation. In other words, there is no evidence that tonsillectomy increases one's immunity to the common cold. On the other hand, there is convincing evidence that in many instances each cold was of shorter duration and this I take to mean that the number

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of secondary infections was markedly reduced. Just how to apportion the credit for this between the tonsils and the adenoids I do not know, but it is my belief that the adenoids deserve the greater share. It has seemed to me that the most important factor in determining whether every cold that a young child has will be of short or long duration is whether

AGE AT THE TIME OF OPERATION.

1st year.....	0	7th year.....	6
2nd year.....	16	8th year.....	2
3rd year.....	14	9th year.....	3
4th year.....	20	10th year.....	3
(50 operated before 5th year)		11th year.....	2
5th year.....	11	12th year.....	2
6th year.....	5		

LENGTH OF FOLLOW-UP IN YEARS.

1 year.....	5	12 years.....	5
2 years.....	9	13 years.....	8
3 years.....	5	14 years.....	1
4 years.....	4	(20 followed 10 to 14 years)	
(23 less than 5 years)		15 years.....	1
5 years.....	6	16 years.....	3
6 years.....	7	17 years.....	2
7 years.....	5	18 years.....	0
8 years.....	9	19 years.....	1
9 years.....	6	20 years.....	0
(33 followed 5 to 9 years)		21 years.....	0
10 years.....	6	22 years.....	1
11 years.....	0	(8 followed 15 or more years)	

BEFORE OPERATION THE NUMBER OF CHILDREN SUFFERING FROM.

Otitis	37	Tonsillitis	31
Repeated colds.....	66	Enlarged cervical glands.....	26
Sinusitis	3	Unexplained fever.....	5
Nasal obstruction.....	19	Loss of appetite.....	6
Croup	14	Rheumatism (three doubtful).....	7
Sore throats.....	34		

after the first acute swelling is over nasal breathing is re-established. Surely the size and position of the adenoids have more control over this factor than the size of the tonsils.

Sinusitis: My own figures on sinusitis are too small to be of any value. Three reported sinusitis before and eight after tonsillectomy.

Nasal Obstruction, Mouth Breathing: Nineteen patients had marked difficulty in breathing through their nose before operation. All of these patients were markedly benefited by the operation. Here again the removal of the adenoids was probably responsible for more relief than the removal of the tonsils. It is, however, difficult to resist removing the tonsils in these patients, as the tonsils are usually large and look as though they might cause trouble. While I believe that marked nasal obstruction should always be relieved when possible, even in infants, I do not believe that the tonsils should be removed routinely in these cases.

Croup: Fourteen patients had croup before operation. No one reported having croup since the operation, but that I know to be wrong. As most of the patients were leaving the croup age when operated upon, I doubt whether the operation can be credited with the general disappearance of croup.

Sore Throats and Tonsillitis: Thirty-four patients had sore throats and 31 had tonsillitis before operation. One reported tonsillitis after tonsillectomy. Forty-five have, to my knowledge, had sore throats since tonsillectomy. Nevertheless, to me a true acute follicular tonsillitis is an indication for tonsillectomy. If we admit that such serious conditions as rheumatic fever and acute nephritis frequently follow tonsillitis, why wait after the first attack?

Enlarged Cervical Glands: Twenty-six patients had enlarged cervical glands before operation, while only six have had a cervical adenitis since tonsillectomy. Persistent enlargement of any considerable degree, which is not tuberculous, of the cervical lymph nodes that drain the tonsillar area is to me one of the absolute indications for tonsillectomy.

Unexplained Fever and Loss of Appetite: Five patients reported unexplained fever and six loss of appetite before tonsillectomy.

Rheumatic Fever: Seven patients had rheumatic fever or rheumatic symptoms before tonsillectomy. Their subsequent histories are interesting. One patient had tonsillitis and severe rheumatic fever which resulted in a damaged mitral valve at the age of ten. Six months later he had a tonsillectomy. He died seven years later in his fourth attack of rheumatic fever.

Another patient had tonsillitis, followed by rheumatic fever, at ten years of age. Following this she had a tachycardia for weeks, but never developed a valvular lesion. She had a tonsillectomy nine months after the attack of rheumatic fever. This was 22 years ago and she has never had any further trouble.

The third patient developed an aortic regurgitation in the course of an otitis and mastoiditis due to the streptococcus hemolyticus. This was in 1929. Her tonsils were removed five months later. She has had no evidence of activity for five years.

The fourth patient had a definite attack of rheumatic fever without endocardial damage in 1929, when he was seven years of age. His tonsils were removed two months later. He had a recurrence with joint pains three months after tonsillectomy but none since then.

The other patients had indefinite rheumatic symptoms but never true rheumatic fever before tonsillectomy. Seven, three and two years have passed since their tonsillectomies without any further developments.

I might add that five patients have had a second operation for the removal of either adenoids or hypertrophied lymphoid tissue in the pharynx. There are at least ten of the eighty-four patients who now have considerable hypertrophy of the lymphoid tissue on the walls of the pharynx and the pillars of the fauces. All but one of these patients had their tonsillectomies before they were five years of age. I am convinced that this troublesome situation arises much more frequently when the tonsillectomy is performed before five than when it is performed after five years of age.

When these patients have an upper respiratory infection, all of this lymphoid tissue becomes swollen and inflamed and at times each follicle will be capped with a tiny spot of exudate. After one of these infections it takes a long time for the swelling and irritation to subside. Operating to remove this hypertrophied tissue has not given satisfactory results in my experience. For this reason I do not believe that a tonsillectomy should be done on a child under four or five years of age except for a direct indication.

To sum up, I believe that enlarged tonsillar lymph nodes, tonsillitis, especially when repeated, and rheumatic fever are all direct indications for tonsillectomy. Frequent prolonged colds, sinusitis, otitis and nasal obstruction demand an investigation of the adenoids and their removal if they are markedly enlarged or so placed as to be probably causing the trouble. I do not believe that every adenoidectomy should be accompanied by a tonsillectomy, especially in young children.

In closing, I wish to suggest that this whole question of tonsillectomy and its relation to other diseases, such as nephritis, rheumatism, otitis and sinusitis needs a careful statistical study, such a study as the Associated Cardiac Clinics are carrying on for cardiac disease. This would mean a trained secretary or two and the collecting and tabulating of uniform records, records that extend over the whole lifetime of the patients. The cost would be small if compared with the amount spent on the thousands of tonsillectomies performed annually in New York City. I believe that such a study would answer many of the questions that we are unable to answer this evening.

815 Park Avenue.

SYMPOSIUM ON TONSIL SURGERY.

V.—A PRACTICAL CONSIDERATION OF THE NASAL ACCESSORY SINUSES IN CHILDREN.*

DR. WILLIAM MITHOEFER, Cincinnati.

When I consented to take part in the discussion of nasal accessory sinus disease in children, I did so fully realizing I had nothing new to offer and that I could, therefore, give you only the results of our personal experience; in other words, speak to you, if you will, out of the practice for the practice. I shall attempt to emphasize what has appeared to us to be the pertinent facts concerning this subject.

It was thought for a long time that nasal sinus disease did not occur in children, and at a later date it was emphasized that the disease was found to be present in certain parts of this country, and not in others. There was little mention made of it until recently in European literature. That it is a clinical entity, we are now universally agreed; and that the seed for chronic nasal sinus disease of adult life, in many instances, is sown in childhood is almost a certainty.

A diagnosis is often not possible in children, because of various difficulties met with in the examination. In the first place, a young child is unable to give us a comprehensive history and, in consequence, the subjective symptoms are not obtainable. It is true, furthermore, in many instances when we are dealing with an acute infection of the nasal sinuses in a child, that the general symptoms of sepsis are very pronounced and that little attention is given to the examination of the nose. Many times there is nothing to be seen upon rhinoscopic examination suggesting the presence of nasal sinus disease. The patient may have no discharge of mucus or pus anteriorly. There is, however, a constant postnasal discharge, because of the presence in an infected antrum of a large ostium or an accessory opening. Irrespective, there-

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fore, of the rhinoscopic examination, the sinuses should be carefully considered in all suspected cases, by applying the various diagnostic methods at our command.

The concealed nature of the disease makes it a very difficult problem in most cases. Many of the acute inflammations of the sinuses gradually subside and the cavities may become clean and healthy, with complete restoration to normal without any treatment having been instituted. For this to take place, it is necessary that the inflammatory process should not have been very severe or long continued, so as to destroy the ciliated epithelium. The natural flow of the cilia towards the normal ostium helps to evacuate the fluid contents of the cavity, and unless this takes place an edematous mucous membrane follows, retention takes place in the recesses, and the chronic state begins. Surgical help by simply washing out or freeing the partially occluded opening is of immense value to these cases, but the mere washing out of an antrum which has lost its ciliated epithelium is of no use, and even after repeated cleansing of the cavity, the old condition will recur. In a very young child, the wide natural opening of the antrum is an anatomical fact which prevents retention. The antrum undoubtedly becomes involved with every acute cold but readily heals, and the disease is not recognized as a true clinical entity because there is a discharge of pus postnasally, which may easily be overlooked.

It is a particular piece of good fortune that the clinical picture of nasal sinus disease is not often seen in the first two years of life, inasmuch as at this time there may occur a very severe infection in the form of an acute osteomyelitis of the superior maxilla. The cause of the osteomyelitic process has not been satisfactorily explained. It is uncertain whether it develops secondary to an antrum infection, or is the result of injury at birth, causing infection of the tooth germs, with secondary bone necrosis. The characteristic features of this disease are nasal discharge, infiltration of the alveolar ridge, with possible fistula, edematous swelling of the soft tissues covering the facial wall of the antrum and extending to the inner canthus of the eye, and inflammatory edema of the eyelids with exophthalmos and chemosis. We have seen two children suffering with this type of osteomyelitis of the superior

maxilla. In both instances, repeated operations for the removal of sequestra were found necessary before healing was complete.

The study of nasal accessory sinus disease in children must begin in the pharynx. A nasopharyngitis, which is probably the most frequent disease of infancy and childhood, is the initial infection, and from this point of entry the disease may travel upward into the nose and accessory cavities, downward into the trachea and bronchi, and laterally into the ear. When the disease spreads into the nose, there is great likelihood that it will not remain in this region. It spreads from the parent chamber (the nose) into the various evaginations (the accessory sinuses). The mucous membrane of the sinuses is weak, pale, thin, poorly nourished, and very liable to infection; just the opposite to the mucous membrane of the nose from which it originates. Very clearly then, the frailty of the one and the hardihood of the other is to be sought in the simple correlation of growth and function. An inflammatory action, which may be of an evanescent nature, in the mucous membrane of the nose may very logically overpower the vitality of the mucous membrane of the nasal sinus.

The clinical picture of nasopharyngitis in infants is somewhat different from that found in older children. The reason for this is quite obvious. Anatomically, we know that the posterior choanae in the infant are small and occupy a high position, in consequence of which a recess is formed in the posterior part of the nasal floor, which favors retention and swelling of mucous membrane when the infant is in the recumbent position. A faulty diagnosis of nasal sinus disease can readily be made in these cases, because of the presence of a nasal discharge. The same may be said regarding the presence of an adenoid in infants during the first year of life. That an adenoid may be present in the early months of life cannot be denied, but that it is usually the cause of nasal obstruction in infancy is not true. Retention in the posterior portion of the nose—so-called "posterior rhinitis"—is many times the cause of the obstruction which slowly disappears as the infant grows older and the posterior choanae become larger and are placed at a lower level. Many of our clinical problems in children will be made easier if we but remember that a nasopharyngitis is often the chief offender and that other

manifestations, such as nasal sinus disease, middle ear inflammation or mild mastoiditis and an intestinal infection are but a part of the clinical picture of an existing nasopharyngitis.

The most difficult, as well as the most interesting problem before the medical profession today is the study of a constitutional dyscrasia. Contact infection is never possible unless the constitution of the individual is ready for it. An individual reacts against certain irritations according to the character of his inner qualities, and these inner qualities we term "constitution." This is not only true of human beings; it is also true of lower forms of life. For instance, a controversy may exist between two bacteriologists regarding a certain type of bacteria. On one side the claim arises that certain changes result from the action of these bacteria. The other bacteriologist says that such is not the case, that the changes which he has observed are of a different nature, and still they both may be right, for it has been shown that bacteria of the same strain react differently.

Every child suffering with allergy, in consequence of which there is present a predisposition to recurrent attacks of nasopharyngitis followed by nasal accessory sinus disease, must be looked upon as one with a constitutional anomaly. The latter may be present in a latent form and not become manifest until an irritant of one kind or another has awakened it into activity. Repeated irritation of the mucous membrane of the nose and pharynx prepares the way for the establishment of a soil which is ready to receive the mildest form of bacterial invasion. We are probably all agreed that the treatment of the allergic child is one of our most difficult problems. Who is there among us who will deny the fact that skin sensitization tests in children are very unsatisfactory? Furthermore, is it not true, after all has been said and done, that the child continues to have the same allergic manifestations in the nose and sinuses for the reason that pathologic changes have taken place? Repeated insults to the mucous membrane of the nose have left their mark in the form of hyperplasia. It is, therefore, not enough in many instances to remove the irritant, desensitize the patient and be content. It is necessary quite often to establish free nasal respiration by removing the hypertrophied overhanging edge of an inferior turbinate, infract the turbinate to the lateral wall and correct a deviated septum. Our experience of attacking surgically the nasal

mucosa of an allergic child, thereby establishing free nasal respiration, has been very satisfactory. We do not wish to imply that this step is immediately taken in all cases. It is only undertaken in well selected cases when all other efforts have failed to bring about free nasal respiration. I am sure that many pediatricians and some rhinologists will look upon this procedure with disfavor. Before passing judgment, however, I wish to say that in order to understand many of the problems referable to this region, it is essential to look upon the nose as a reflex organ. The nose may be irritated from without, from within its own chambers and from some general systemic derangement. Therefore, in our estimation it is quite proper to remove one of the causes, if present, within the nasal chamber which may be the chief irritant. So much for allergy.

Removal of adenoid tissue is imperative, inasmuch as an adenoid and an infected sinus may play into each others' hands. We know that an infected adenoid mass is the means of producing a continual congestion of the nasal mucosa and it therefore must follow that congestion of the sinus mucous membrane also results. It would be interesting to know how many children have a nasal sinus infection present at the time of a tonsil and adenoid operation. We may be quite sure that many times during the performance of this operation the condition of the nose and nasal sinuses is given no consideration. It can be admitted also that many children receive no benefit after a tonsil and adenoid operation until at a later date the nasal sinuses which were inflamed from the very beginning of the treatment are given the attention they deserve. Inasmuch as the maxillary sinus is usually the chief offender in children, would it not be more to the point for us to turn our attention to these sinuses at the time of the tonsil and adenoid operation? I am revealing no secret when I say that too many tonsil and adenoid operations are performed without a careful rhinological examination having been made. It behooves both the pediatrician as well as the rhinologist to give this fact their earnest consideration.

I am, furthermore, not indifferent to the presence of a nasal sinusitis in many of the cases of mastoiditis, and that the mastoid disease corresponds, in many instances, with the more infected side of the nose. When a nasal sinusitis is found, it is advisable to treat the same before or during the perform-

ance of the mastoid operation. Due regard should be given the possibility of a sepsis following the mastoid operation as originating in the nasal sinuses, especially if, at the time of operation, it was found that there was present a sinus involvement. The simplicity of irrigating the antrum under general anesthesia and the few minutes employed for its performance should be an indication for its more frequent employment. This applies not only to acute mastoiditis, but also to an otorrhea which is slow in responding to local treatment.

Too much stress cannot be made upon the importance of the treatment of an antral suppuration in a child with bronchiectasis. The correction of nasal obstruction, intranasal, and if necessary, radical sinus surgery are indicated, especially if there is good reason to believe that the bronchiectasis is of nasal sinus origin. Procrastination and continual conservative treatment in these patients is of no benefit, as the lower respiratory tract continues to be infected from above and the condition of these unfortunate children becomes pathetic.

A child with an acute involvement of the nasal accessory sinuses should be put to bed, especially if there is present a rise of temperature. Inasmuch as there is usually present a nasopharyngitis, aspirin should be given in proper dose, as it seems to act as a specific for this disease. A low grade fever remaining after an attack of nasopharyngitis is often controlled by the administration of pyramidon or quinine, if the focus is present in the nasopharynx. If the cause of the fever is in one or the other of the nasal sinuses, more stringent measures may be acquired. The diet should be restricted and free elimination insisted upon. The use of nonspecific protein therapy is strongly indicated in the acute stage of the disease, as it is also in the subacute period. We have, for the past seven years, used the preparation called Omnadin and give it in doses of 1 to 2 cc., injected intramuscularly once daily for at least three to five days. The lipoid contained in Omnadin is of greater value than the fat and protein. Following the injection there is a mild reaction of the cellular elements of the body; in other words, a teasing dose instead of an overwhelming one which often follows the injection of a milk preparation. This fact makes Omnadin a very satisfactory agent in infections occurring in children, especially in the early stage when the immunity of the patient is at its lowest ebb.

The child should be thoroughly alkalinized at this stage of the disease unless there is present a vasomotor disturbance without fever, at which time we must think of a possible alkalosis and use the acid treatment instead.

During the acute stage of the disease, little if any local treatment should be used in the nose. This is imperative, for it may be followed by a severe reaction if there happens to be present a streptococcus hemolytic infection. Instillations of various medicaments into the nose are beneficial if nasal obstruction is present. We view with disfavor the habit of placing in the hands of the mother one of the various silver preparations to be used in a haphazard way for instillation into the nose, for the reason that we have seen three patients with argyria following the use of one of these preparations during the past five years. It is highly important that free nasal respiration be obtained. We are in the habit of using the following solution:

Zinc sozoiodol, 0.05; novocain, 0.1; solution adrenalin chloride (1:3000), 3.0; aqua destillata, 10.0. M.S. Nose drops. Five drops (warmed) in each nostril three times daily.

Ephedrin, if it does not irritate the mucous mebrane, may be used. Older children find much relief after the inhalation of two teaspoonfuls of the following solution, placed in a pint of steaming hot water and inhaled four to six times a day, five minutes at a time:

Menthol, 2.0; oil eucalyptus, 2.0; alcohol, 120.0.

During the inhalations the head is covered with a towel. It is highly probable that the retained heat under the tent has some effect on the inflamed mucous membrane of the nose and sinus. This solution, however, should not be used in young children. If the secretions are very tenacious, small doses of iodine must be given. When the fever has subsided, infrared radiation is a useful adjunct. If the child will permit of its use, we have employed Bier's hyperemia. It has a very beneficial action on the accompanying nasopharyngitis. An elastic band, one inch wide, is placed around the neck immediately above the clavicle and allowed to remain three hours. It is then removed and replaced in one hour. The band is tightened until the patient experiences a fulness in the head. Passive hyperemia thus induced has a beneficial

action on the infected mucous membrane and very often relieves a sore throat when other measures have failed. The contraindications to its use are peritonsillar, retropharyngeal and ear inflammations.

The management of a child with chronic nasal sinus disease is no small problem, inasmuch as these cases cannot be approached in the same manner as can the chronic sinus disease present in the adult. We are all undoubtedly in agreement with this thought. Another explanation for the difficulty is the fact that an infection of the nasal sinuses in children may be caused by so many different conditions, both local and general. To treat a patient with local measures only is not tenable. Conservatism in the treatment, however, must be the axiom. It needs no great play of the imagination to realize that conservative treatment of a chronic case has many pitfalls. How shall we proceed? First of all, let us consider the subject from the standpoint of a general dyscrasia which may play the most important part and should be given earnest consideration by both pediatrician as well as rhinologist.

A very frequent dyscrasia met with in children with nasal sinus disease is thyroid insufficiency. Unsatisfactory children are very often subjects of this deficiency. We must always bear in mind that one of the most important functions of the thyroid gland is that of fixing the calcium salts in the body. It is furthermore quite evident that thyroid secretion acts in a defensive manner against bacterial invasion of the upper air passages. I am rather inclined to the opinion that the thyroid gland very often acts insufficiently following a specific disease, especially the exanthemata. If we realized this fact more often and applied the proper treatment, I am sure that we would deal more successfully with the period of convalescence following acute infections. When we have before us a child presenting some of the symptoms of thyroid inadequacy, *i.e.*, constipation, slow pulse, subnormal temperature, dry skin, asthenia, cold hands and feet, enuresis, night terrors and a history of repeated attacks of nasopharyngitis, thyroid medication is strongly indicated. We have found the dose of one-quarter of a grain of the extract, given before the evening meal or at bedtime, to be a sufficient dose for young children. A larger dose may readily be given older children. It is well to begin with small doses and increase

slowly, watching the body-weight at weekly intervals. If the weight increases, the drug may be continued, but if it remains stationary or decreases, the drug must be discontinued for a short time. A record of the temperature between 4 and 6 P.M. should also be kept, and if a subnormal temperature rises to normal, medication should be stopped for one week. One of the first signs of intolerance is the presence of a coryza. This occurs before tachycardia, diarrhea and nervous excitement. The last-named symptoms of intolerance rarely take place if the thyroid medication is properly used. With careful supervision of the dose and increasing the same slowly to point of tolerance, thyroid medication assumes an important place in the treatment of nasal sinus infections, inasmuch as hypothyroidism, although often of a benign character, is accompanied by infiltration of the mucous membrane, which offers a fruitful soil for bacterial invasion. When the tolerant dose of thyroid extract has been ascertained it should be given daily for three weeks of every month.

Our attention has been directed at frequent intervals to the presence of a chronic intestinal stasis in children suffering with thyroid deficiency. The administration of thyroid extract very often does away with the tendency to constipation. Intestinal putrefaction may, however, continue and requires more stringent means in the form of diet, massage, intestinal antiseptics, etc., for its amelioration. About one thing I am convinced: that treatment of the thyroid insufficiency alone, without consideration of the existing intestinal toxemia, is of little benefit. Chronic autointoxication is an indication that the drainage system is defective and when this takes place the resistance becomes lowered, the soil is prepared and bacteria have full sway. The action of the toxins circulating in the blood so change the mucous membrane of the nasopharynx that the existing bacteria in this region readily become virulent and take full possession. The result is a nasopharyngitis, sometimes very mild at the beginning—the precursor of nasal sinus disease. A child with chronic intestinal stasis looks pale and pasty; it is pot-bellied with flabby abdominal muscles. The hands are clammy and the feet are cold; there is also a history of frequent colds, acidosis, poor appetite, unpleasant breath; the child is irritable and tires easily. A patient of this type is a good candidate for nasal sinus disease.

Much stress has been laid on the importance of a high vitamin diet in children of this type. It would be futile to deny the fact that an intensive vitamin diet is often necessary to restore the balance. This has been scientifically, as well as practically, demonstrated by many workers in this field. Dairy products, salads, uncooked fruits, cooked green vegetables are essential, supplemented by cod liver oil, viosterol, etc. The point we wish to make is that treatment of the intestinal stasis and thyroid insufficiency, plus the administration of a high vitamin diet, is of great importance in handling these cases. To lay all stress on the elusive vitamins alone is not sufficient. It is very fortunate, however, to know that we have established a vitamin balance, just as it is important to the economy that we have an endocrine balance. Both vitamins and glands of internal secretion are dependent on each other. Without a rich supply of the vitamin-containing foods and the proper functioning of the endocrine glands, good health is not obtainable. Again the question of the constitution—a very individualistic and interesting problem.

The child must be taught to blow the nose in a proper manner. If possible, the nasal drill as advocated by G. Hickling, should be used. The method of using the drill is as follows:

1. Hold a piece of gauze beneath the nose.
2. Grasp the top of the nose between the eyes with the right thumb and forefinger, the elbow being raised to shoulder level, leaving the nostrils open.
3. Blow the nose and at the same time bring the head forward and down, and depress the right elbow to the waistline, the top of the nose still being held.
4. Inspire and raise the head to the first position, repeating the process ten to 15 times in a rhythmic manner.

We attempt to institute in all cases a course of hydrotherapy, inasmuch as the proper care of the skin is one of the means of producing greater immunity. The aims and objects of hydrotherapy are to increase elimination, to improve nervous tone and general metabolism, and to train the cutaneous resistance to heat and cold, thereby improving the circulation of the blood in the cutaneous areas. The child is given a hot bath three times a week, lasting ten minutes, the bath containing either

one pound of seasalt or magnesium sulphate. This is followed by a brisk massage of the body, using for this purpose oil of juniper or a lubricating jelly. Sufficient rest, especially after meals, and exercise in the open air in the form of walking should also be insisted upon. The child should not be exposed to draughts, and should remain away from crowded assemblies. Swimming is interdicted. I need not dwell upon the beneficial effects of a change of climate. Ultraviolet radiation is but a mild adjunct. Thyroid therapy may be aided by the administration of calcium gluconate with meals and cod liver oil after meals. Furthermore, we must not forget that a sugar shortage is many times present and that a child's desire for sugar subserves a valuable physiological function and should be gratified. Two teaspoonfuls of glucose in weak tea or lemonade, twice a day, is sufficient for this purpose.

I have never found anyone who has been wonderfully pleased with the results obtained by conservative local treatment of the nose in chronic sinus disease, whether in children or adults. We must always bear in mind that the pathological changes in the nose are secondary manifestations of the sinus disease. The best that we can hope for with this treatment, whether it be by topical application or tampon, is to establish better breathing space. A combined suction and irrigation treatment has met with a fair degree of success at our hands. Subacute cases respond very well with this form of treatment. We heartily recommend after cocainization the application of trichloroacetic acid, full strength, to the lateral wall of the nose opposite the middle turbinate, the floor of the ethmoid and along the edge of the inferior turbinate. This procedure gives better breathing space, reduces edema and swelling in the region of the ostia, and has many times relieved a headache which has been present a long time. The use of autogenous vaccine is sometimes very successful, especially if it has been demonstrated by skin reaction that the patient is sensitive to the bacteria found upon culture.

Irrigation of an antrum should never be undertaken in the presence of fever, nor should it be repeated if a severe reaction follows the first lavage. We are in the habit of using Fischer's Modified Ringer's Solution for irrigation, but in severe infections, or if reaction takes place after irrigation, we prefer substituting for the watery solution a mineral oil.

This latter agent does not tend to liberate the bacteria retained within the leukocytes as does the watery solution. The following is the formula for Fischer's Modified Ringer's Solution:

Sodium chloride, 263.7 gm.; calcium chloride, dry, 21.0 gm.; potassium chloride, 10.6 gm.; aqua destillata q.s., 1000.0 cc. 25 cc. of this mixture is diluted in 500 cc. of freshly boiled water.

Our method of approach for irrigating the antrum is usually in the supratubinal area; first, because of the membranous structure of the wall in this region, and secondly, for the reason that there is present very often a very large normal ostium or an accessory one.

Failure to establish a normally functioning antrum cavity after repeated washings calls for surgery. To proceed deliberately with intranasal surgery without giving due consideration to all factors, both local and general, is in our mind a grave error. It is a discredit to rhinology when this is done. We favor making a counter-opening above the inferior turbinate rather than doing a window resection below the turbinate. Ventilation is much better in this area because of the course of the inspired air in this direction. The path of the ciliary action of the mucous membrane of the antrum has been shown to extend from the floor of the antrum to the region of the normal ostium. This makes the presence of a large opening in this region very desirable. At the time of the operation the middle turbinate is infracted toward the septum, the inferior turbinate infracted toward the lateral wall and an overhanging, hypertrophied edge and posterior end removed if necessary. Free nasal respiration is imperative after the operation. Radical surgery is rarely indicated except in extreme cases of polyposis which, fortunately, are seldom seen in children, and in orbital complications following one of the exanthemata.

The chronic suppurative type of antrum disease responds well following intranasal surgery. If, however, an antrum is acting as a reservoir for the pus from above, a good result will not be obtained until the infected ethmoid cells are removed. When there is present a serous catarrh of the antrum with edematous mucous membrane, intranasal surgery is often

of no benefit. It is in this type of disease where it behooves us to hesitate in our surgical endeavor and attempt by other means, both local and general, to bring about relief.

How can I prevent my child from having sinus disease? This is a question often asked both the rhinologist and the pediatrician. There is no definite answer to be given, except that one insists on hygienic measures of living. Attempts to familiarize oneself with a constitutional anomaly which may be present, local measures, such as the removal of tonsils and adenoid, and the removal of a nasal obstruction, from whatever cause, are always to be insisted upon. Nasal sinusitis present in one or both parents may be the means of involving a child. We have surmised in many cases that this was a fact. Early and efficient treatment of the parental infection is, therefore, of prime importance and should be included in the preventive treatment of nasal sinusitis of the offspring.

The observations made by Bucky and Kretschmer following Roentgen therapy of the chest for enlarged bronchial glands in children is of interest. They found that the general resistance of the patient was markedly increased following exposure to the X-ray, that the appetite returned, the blood picture showed an increase of the hemoglobin and red cells, and the child gained in weight. We have recently applied this form of treatment to our nasal sinus cases in children and hope to give a favorable report at some future date. The technic of the radiation is as follows:

Area of each field, 15 by 15 cm.; target-skin distance, approximately 26 cm.; parallel spark gap, 39 cm.; filter, 3 mm. aluminum plus 0.5 mm. of zinc. Time, 10 to 15 minutes. Dosage, $\frac{1}{4}$ erythema dose. Repeat in eight weeks if necessary.

In conclusion let it be said once more that the treatment of a chronic nasal sinus infection in a child is no small problem. Good, lasting results in the treatment or following operative measures are not the rule—they are the exception. When pathological changes of the mucous membrane have once taken place and the constitutional dyscrasia, whatever it may be, known or unknown, still persists, there is little chance for restitution until the pathology can be removed after the period of adolescence. Our plea is, therefore, to treat carefully the acute and subacute infection, and not to dismiss the patient

until we are satisfied that all inflammatory reaction has subsided, especially if it has been present in the antrum. This is one way, at least, of trying to prevent chronicity.

I have attempted to give in this paper our present day views on this subject and hope that some of the thoughts expressed will be acceptable to you.

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19 Garfield Place.

RESEARCH STUDY CLUB OF LOS ANGELES.

The Research Study Club of Los Angeles will present its fourth annual clinical course from Jan. 21 to Feb. 1, 1935, in Los Angeles. The guest lecturers in Otolaryngology will be Dr. George Portmann, of Bordeaux, France, and Dr. John Barnhill, of Indianapolis and Miami. The guest lecturers in Ophthalmology will be Dr. Webb Weeks, of New York, and Dr. Harry Gradle, of Chicago.

As usual, the ophthalmological subjects will be given in the forenoon, while the otolaryngology will occupy the afternoon and evenings. The courses in dissection, given by Dr. John Barnhill, will be given in conjunction with the University of Southern California Medical School. The fee for the entire course will be \$50.00.

For further information and a detailed program of the course, please communicate with Dr. Don Dryer, 2007 Wilshire boulevard, Los Angeles.

STRIPPING OF THE VOCAL CORDS.*

DR. JOHN M. LORÉ, New York.

To laryngologists, the formation of the so-called adventitious cord in the laryngofissure or thyrotomy operation is well known. Still it is a remarkable thing when one stops to think that after the removal of the true and false cords and adjacent tissue clear down to the thyroid cartilage, there is enough replacement of tissue to produce a structure which objectively looks not unlike a true vocal cord. And not infrequently it is practically impossible to determine by inspection which is the new cord and which is the normal cord.

If this regeneration or reformation can take place when so much tissue has been removed, it does not seem so unusual or unreasonable to expect that the same process should take place in cases where less extensive surgical procedures have been employed. Punching out of the vocal cords and the subjacent tissue in double abductor paralysis has been proven unsatisfactory because of this very regeneration or replacement of the tissue removed. And so with accidental stripping of the vocal cord itself in the removal of some benign growth of this cord, there has been complete restoration of the part. What takes place in this healing process and to what practical use can one utilize this knowledge? To this end a series of experiments on the larynges of cats was carried out.

Briefly, the procedure has been to remove one vocal cord, leaving the other one as a control. The removed cord has been examined microscopically to check it against the new one formed. At various intervals after this removal the larynx has been examined by direct laryngoscopy, to note the degree and method of healing. After complete healing has taken place, the larynx has been removed and the newly formed cords examined microscopically and compared with the original cord removed.

The cats used have been large ones. The operations were performed under ether narcosis. The Jackson anterior com-

*Read before New York Academy of Medicine, Section on Otolaryngology, April 25, 1934.

missure speculum was used to expose the larynx and various types of punch forceps were used in the actual stripping or removal of the cords. In this work, grateful acknowledgment is made of Dr. Ruth Sullivan's assistance. The examination of all tissues removed was made by Dr. Alexander Fraser. He found that the only difference between the normal cord and the regenerated one was that of thickness, and this depending upon the length of time after healing had taken place.

SERIES OF EXPERIMENTS, No. 1.

Cat. No.	Operation	Observation	Postmortem
1	6/16/32. Removed anterior 2/3 of right cord.	6/17/32. Aphonia almost complete. 6/29/32. Right cord shows regeneration; voice coming back. 9/21/32. Voice somewhat hoarse. Right cord pearly white but edge is somewhat irregular.	9/28/32. Right cord not perfectly straight, due to fact that only anterior 2/3 of cord was removed instead of the entire cord.
2	6/29/32. Removed left cord by stripping—sent to laboratory for microscopic study.	9/21/32. Voice slightly hoarse. Left cord looks like right except that it is slightly thinner.	9/28/32. The new left cord could not be distinguished from the right normal one. Microscopically it was like the original in structure except that it was thinner.
28	3/13/33. Removed 1. cord.	3/22/33. Voice improving. Left cord being replaced by new tissue. Very little deformity. No impairment in movements.	5/30/33. Larynx removed. Gross appearance: 1. cord seems to have regenerated—can barely distinguish between new and normal cord. Before death voice was returning.
17	2/16/34. Removed left cord, including some muscle tissue.		3/8/34. Healing not complete—some bowing; epithelization started.

CONCLUSIONS BASED ON SERIES OF EXPERIMENTS, NO. 1.

Based on a microscopic study of the removed, normal and regenerated vocal cord, it seems permissible to state that a vocal cord will regenerate structurally. The only difference

noted was that the new cord was thinner than the normal one, but we felt that had the new cord been examined later, even this difference would not have existed.

Grossly, no difference could be noted whereby one could distinguish between the two cords.

Functionally, there was no impairment in movements, but considered from the voice production aspect, there was in some a change in voice which in all probabilities would have cleared up in time. However, it must not be forgotten that in these

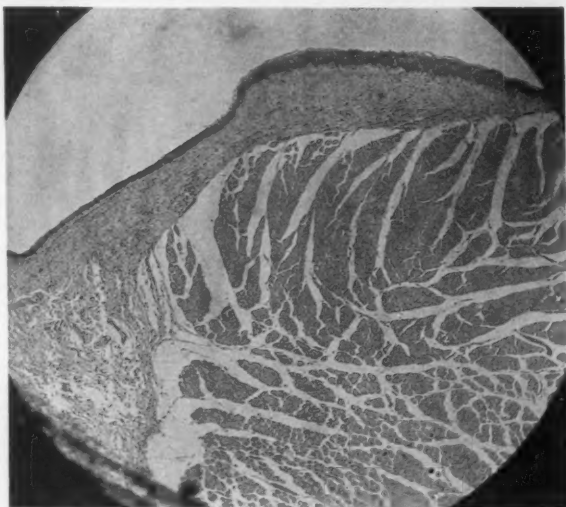


Fig. 1. Normal cord of cat.

experiments we started with a normal larynx and normal voice, and one could not very well expect improvement on these. In the practical application of this operation on the diseased cord producing hoarseness, we felt that we were justified in expecting an improvement both in the appearance of the cord and in the production of sound.

An important consideration in this operation was that after stripping the cord, the new, raw free edge should be straight. The importance of this became more obvious after "series of experiments No. 2" were completed. Having satisfied our-

selves that the vocal cord could regenerate and that the new cord could not be distinguished (objectively) from the normal cord in those cases where the cord was stripped off evenly, the question naturally arose as to how irregular punching out of portions of the cord would affect healing. To determine this, another series of experiments was carried out in which wedged-shaped pieces or irregular portions of a cord were removed, and then noting the end results after healing had taken place.

SERIES OF EXPERIMENTS, No. 2.

Cat. No.	Operation	Observation	Postmortem
40	11/23/33. Punched out two pieces from left cord, including muscle.	2/16/34. Found slight bowing at anterior 2/3 of left cord. Right cord comes over to meet the left and fill the concavity. Voice good.	3/8/34. Bowing gone—cord very prominent.
41	11/23/33. Punched out cup-shaped piece from left cord (muscle included).	2/16/34. Left cord thinner than right one. The free edge is straight from anterior commissure to vocal process (outer aspect). Tab of granulation tissue on vocal process—voice good.	3/8/34. Same as on 2/16/34. Tab of tissue on vocal process still present.
34	2/16/34. Removed wedge-shaped piece from anterior 2/3 of left cord, using wedge-shaped punch forceps.		3/18/34. Defect partially filled in—epithelization not complete—apparently growing in from ends.

CONCLUSIONS BASED ON SERIES OF EXPERIMENTS, NO. 2.

It was quite obvious that the vocal cord which was evenly removed would reform and assume an appearance nearer to normal than the one in which an irregular piece was removed.

These latter ones had a tendency to bow, because of scar tissue formation, but to compensate for this concavity in the new cord, the other normal cord became convex (at its free edge) and was thus able to obliterate the defect. The end result was a good voice.

The observations have not been carried sufficiently long to state whether this bowing would be permanent or not.

Irrespective of this, it seems fair to state that irregular wedge-shaped pieces should not be removed from a vocal cord. The wedge-shaped forceps in particular seems to be a poor type of instrument to use in vocal cord surgery (excepting, perhaps, in the removal of webs at the anterior commissure), especially when such an excellent one as the Imperatori subglottic forceps (with or without some modifications) is available. Another thought suggested itself. Remember that when a vocal cord was stripped smoothly, leaving a straight free edge, that the edge of the new cord was perfectly straight,

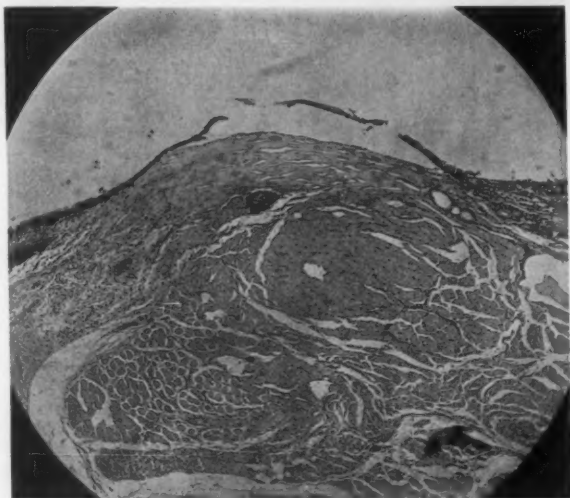


Fig. 2. New vocal cord in cat (low power).

extending from the vocal process to the anterior commissure. Why, then, couldn't a bowed cord be made straight by removing tissue from its free edge so that immediately after removal this edge looked straight?

In order to do this, more cord tissue would have to be removed from the anterior and posterior thirds; in fact, it might be necessary to remove some of the subjacent tissue at these points. While it was felt that the probable result would be satisfactory, it was decided to test this operation on an

experimental animal before attempting it on a human. With this in mind, an attempt was made to produce a bowed cord in cats without operating on the vocal cord itself. Tissue was removed from the floor of the ventricle immediately external to the vocal cord with the expectation that when healing was completed the cord would be bowed. This was attempted in three cats, but in only one could a bowed cord be produced. This may have been due to lack of proper instruments, preventing the removal of tissue deep enough from the floor of the ventricle without injuring the cord. Further efforts along

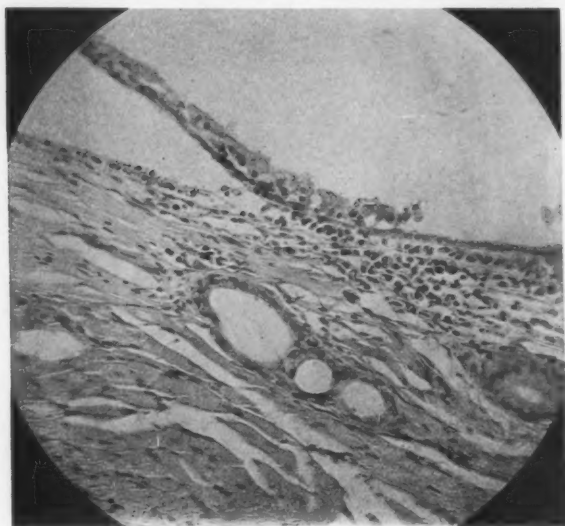


Fig. 3. New vocal cord in cat (high power).

this line will be made and if successful will attempt severing the external laryngeal branch of the superior laryngeal nerve. Should a suitable patient present himself with bowed cords. the operation will be tried on him with his consent.

CONCLUSIONS BASED ON SERIES OF EXPERIMENTS, NO. 3.

While the series failed to produce bowed cords (except in one case), it was felt that poor technique and improper instruments were responsible. With a smaller punch forceps and

a more extensive removal of tissue from the floor of the ventricle (including fibres of the thyroarytenoid muscle), a bowed cord may result. We hope to continue the work and then apply it to bowed cords in the human.

SERIES OF EXPERIMENTS, No. 3.			
Cat. No.	Operation	Observation	Postmortem
Black & White Small	3/6/33. Stab wound external to left cord, through floor of ventricle—cord was too small to permit removal of tissue external to cord.	3/13/33. Left cord swollen, moves freely—no bowing. Removed anterior $\frac{1}{2}$ of left cord with cup-shaped forceps.	
		3/22/33. Smooth granuloma on posterior $\frac{2}{3}$ of left cord. Movements not impaired.	
		3/27/33. Granuloma smaller and paler—left new cord can be seen.	
		11/2/33. Granuloma gone. Left cord slightly paler than the right. Movements normal.	
26	3/13/33. Removed tissue external to left cord and thru floor of ventricle.	3/27/33. Good movements and approximation—voice good—see note under operation.	6/11/33. Cat died from other cause. Larynx showed scar tissue in floor of left ventricle. Left cord seems slightly bowed. Voice was good.
	3/27/33. Removed more tissue from floor of left ventricle.		
29	11/2/33. Punched mucous membrane from surface of left cord and floor of left ventricle.	2/16/34. No signs of bowing—scar tissue demonstrable.	3/8/34. No bowing; small area of scar tissue external to and above cord.

This experimental work was preceded and supplemented by its application to humans.

What should constitute the indications for this operation? How far could one go? Could the operation be repeated on

the same cord if the first were not complete or satisfactory? How soon could one expect complete healing? And finally, did the end result justify the operation? These questions were natural ones, and before answering them will cite just a few case histories.

Case 1: Miss R. C. First seen in 1920 for chronic hoarseness. She was found to have a chronic laryngitis and sinusitis. Vocal cords were very much thickened and irregular, and showed a piling up of tissue on them. She received local



Fig. 4. Hyperkeratotic papilloma with some areas of early malignancy.

as well as sinus treatment, but she remained hoarse. She had a complete work-up, which was negative. She was treated during the ensuing year with no appreciable result.

I next saw her the latter part of 1929, at which time I noticed that "both cords were covered with mucous. Right cord has appearance not unlike a keratosis; less so on the left side. Left arytenoid large." Removal of tissue was suggested, but it was not until March 7, 1930, that it was done. Tissue, removed from the entire length of the right cord, was

reported as fibrous polyp. In two weeks time there was a marked change in her voice and in the appearance of the larynx.

Case 2: Mrs. E. A. This woman was a sister of the patient in Case 1, and was first seen by me in November, 1929, with a history of hoarseness of less than one year's duration. Laryngeal examination showed polypoid thickening of both cords, especially the right one. Internal to vocal processes was some polypoid tissue. Local treatments produced no lasting results.

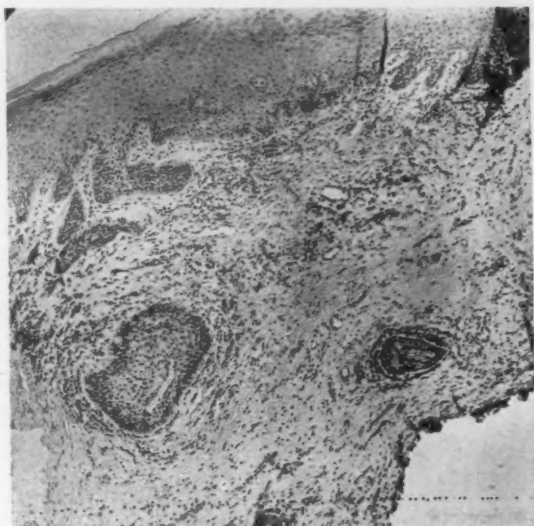


Fig. 5. Hyperkeratotic papilloma. There is good orientation of tissue. Cross sections of two gland ducts show metaplasia of the epithelium.

She was again seen in April, 1931, at which time removal of tissue from the cords was advised. This advice was based on the experience had with the sister. She did not accept operation until Nov. 5, 1931, when she was operated upon at St. Vincent's Hospital. In her case tissue was removed from the entire length of both cords by means of punch forceps. Dr. Fraser reported polypoid tissue. The functional result was startling. Not only her voice, but her personality changed

— whereas she used to be afraid to talk, she was now more willing to indulge in conversation; in fact, she has resumed teaching.

Case 3: Mr. J. J. M., lawyer, was first seen at the Manhattan Eye, Ear and Throat Hospital with a history of hoarseness for several months. He had become so hoarse that he had to give up the practice of law.

Laryngeal examination showed whitish raised areas on both cords, comparable to what Dr. David Jones has been pleased

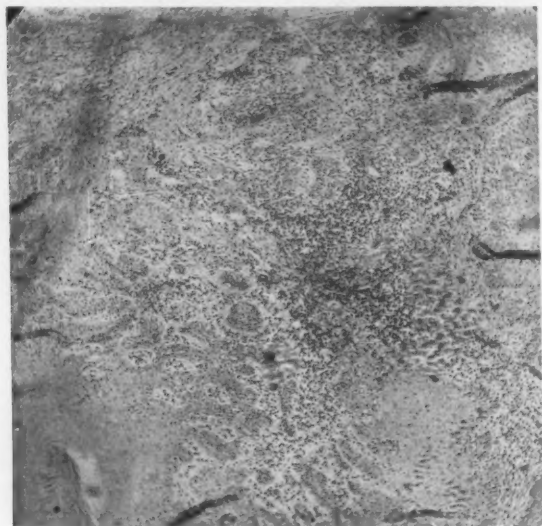


Fig. 6. Hyperkeratotic papilloma showing early signs of malignant changes as shown by the detached islands of cells in the stroma.

to call blotting paper. A diagnosis of hyperkeratotic papilloma was made and this was confirmed by biopsy. Blood Wassermann and chest were negative.

Treatment consisted in surgical removal. The right cord was entirely stripped off with the papilloma on it. The left cord was more difficult to strip off and had to be removed in several stages. The examination of tissue removed on next to the last operation showed beginning malignancy. The

laryngeal picture now is entirely different, there being two new adventitious cords with a good serviceable voice.

Case 4: M. C., age 56 years, was also first seen at the Manhattan Eye, Ear and Throat Hospital, complaining of hoarseness. Examination showed hyperkeratotic papilloma on both cords. This diagnosis was confirmed by biopsy. The left cord was operated upon first, and according to Dr. Andrew Eggston, "microscopic section reveals the softer mass as polypoid tissue. The denser mass consists of an atypical squamous



Fig. 7. Fibrous polyp of vocal cord with atrophy of mucosa. There is a technical artefact where the tissue was torn. No dilated or thrombotic veins are evident.

celled hyperplasia with signs of infiltration and active mitosis. The cells contain a large amount of hyaline and a few pearls are present; some atypical mitosis is present. Very little adjacent structures are present to determine the relationship." No recurrence was noted on the left cord. Several weeks later the right cord was stripped and examination of this tissue showed hyperkeratotic papilloma. This last operation was performed Dec. 8, 1933, and to date there has been no recurrence. The functional result has been satisfactory.

Indications: It will be noted in the cases cited that in no instance was the lesion a single or small one, such as a papilloma or polypus, but rather that the pathology was extensive and involved almost all, if not the entire cord and in some cases was even subglottic. No case of ordinary multiple papilloma has been operated upon by this method, although in the noninfectious type one might attempt it.

Thus far, chronic thickening (hypertrophic) polypoid degenerative changes and hyperkeratotic papilloma have constituted the indications. We are particularly impressed with its possibilities in the polypoid cords and those with hyperkeratotic papilloma.

In the two cases of hyperkeratotic papilloma, malignant changes were found. In neither of these cases was such a condition suspected, even though we consider them precancerous lesions. Or are they really cancerous? In any event, both of these cases have been carefully followed up and to date there is nothing in their larynges to make one suspect malignancy. The lesson learned from these two cases has been to have no fear in going deeply and extensively, removing all involved tissue.

In some of our early cases we were timid about taking off too much tissue, but we soon overcame that. If necessary one may go as deeply as the thyroarytenoid muscle or operate several times if some diseased tissue has been left.

The average healing time has been about four weeks, although for a functional result one must wait longer. The end results speak for themselves. Certainly with an improvement in the technique and a proper selection of cases, this operation can be expected to give good results, both clinical and functional.

The technique employed in the human has been as follows:

Anesthesia: In order to secure complete rest of the cords, general anesthesia, supplemented by local anesthesia, has been employed in almost all cases. After the patient has been fairly deeply etherized, the larynx has been exposed by laryngoscopy and painted with a solution of cocaine HCl 10 per cent; one application is always made subglottically.

This form of anesthesia has proven very satisfactory. The last case was done under local anesthesia, but this was done because the patient was unusually tolerant and co-operative.

Instruments: Either the Jackson laryngostat or anterior commissure speculum may be used, although the anterior commissure speculum is preferred. The Imperatori subglottic forceps is used almost exclusively, although a modification of this instrument for the right and left cords is being worked out.

Based on the experimental work on the cats, one may state that wedge-shaped punches should never be used in this operation.

The Operation: If the left cord is being operated upon, the anterior commissure speculum is introduced from the right side of the mouth. The beak of the instrument is inserted between the two cords and then rotated to the right so that the beak is against the right cord and the left cord is fully exposed and fixed. With the instrument in this position a full view of the cord is obtained, the floor of the ventricle, in most cases, is brought into view, and if any pathology exists subglottically, this can be visualized.

By means of the Imperatori subglottic forceps (or its modification, *viz.*, a right and left sided forceps with the lower blade fixed), the diseased tissue is removed with the cord by punching or stripping off the cord. It is important that the long axis of the punch forceps be kept parallel to the free edge of the cord. The removal of the cord may extend as deeply as the fibres of the thyroarytenoid muscle, onto the floor of the ventricle, or subglottically. If the diseased condition of the cord prevents its being stripped off, then it is removed by means of a series of punches, always bearing in mind that the long axis of the punch forceps be kept parallel to the cord. The tip of the vocal process is to be avoided.

To avoid synechia, only one cord is operated upon at a time and care is exercised to see that the other cord is not traumatized. After healing has taken place the other cord may be operated upon if necessary. At no time has troublesome bleeding been encountered. If it turns out that the first operation has been incomplete, the procedure may be repeated. It will be found, however, that as one's technique improves, repeated operations will be unnecessary.

There is no special postoperative care. No laryngeal applications are made, although an oil spray at times induces some comfort.

The patients are encouraged to use their voices at once, rather than observe a period of silence. Naturally the voice at first is quite bad, but it soon starts to improve.

A month is considered a fair healing period, although a longer period is required for a functional result.

In observing these cases postoperatively, we occasionally found an overgrowth of granulation tissue which looked not unlike diseased tissue. But by being patient this tissue disappeared as the stratified squamous epithelium grew in from the edges and covered the denuded area. At first the new cord, after complete epithelization, is pink but soon assumes a gray and then a whitish appearance, not unlike a normal cord.

The end results obtained to date justify the further application of this operation. It must be stated in all truthfulness that in some cases the results have been somewhat disappointing, but the reasons in these cases have been incomplete surgery, lack of proper follow-up and reoperation, and poor technique by the occasional operator.

325 West End Avenue.

ARRESTED ASTHMA AND HAY FEVER: REPORT OF A
CASE WITH CONSTITUTIONAL REACTION
FROM AN INTRADERMAL TEST
WITH MUSTARD.*

DR. H. HAROLD GELFAND, New York.

This case is presented with a view of showing that the results of the treatment of asthma and hay fever may be successful or unsuccessful, depending 1. upon the proper and exact localization of etiologic factors, and 2. upon the degree of cooperation on the part of the patient, which is a very important consideration. In connection with the case, there occurred a severe constitutional reaction from an intradermal test with mustard.

In this particular case, attention is called to the facts that the etiology of the condition was easily determined, proper methods of treatment were clearly indicated and outlined, and the patient cooperated fully in carrying out instructions despite all the attending complications. Up to the present time the results of treatment may be considered as 100 per cent successful.

CASE REPORT.

History: J. B., a man, age 40 years, was seen in February, 1931, complaining of symptoms of asthma, seasonal hay fever and perennial rhinitis. His family history was negative for allergy. He was employed as a baker. The duration of his asthma and hay fever dated back 13 years, the attacks of asthma, moderate to markedly severe, occurring from three to four times weekly and lasting from one to two hours. His past history was otherwise negative. Previously, in 1928, he had been treated for this condition at another clinic with unfavorable results. In 1928, an operation was performed for a pathologic condition in the nose, the nature of which could not be determined.

*From the Department of Allergy, The Gouverneur Hospital, New York City.

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In February, 1931, his attacks of asthma were of decided severity, with nocturnal and early morning seizure, which to a less degree continued to recur during the greater part of the day. He stated that all kinds of medicaments had been prescribed and his own family physician had been giving him hypodermic injections for the asthma. He had also been instructed how to give himself injections.

There were no animal contacts. The patient slept on a cotton mattress and on cotton pillows.

Examination: His tonsils were rather enlarged. His teeth were negative. There was wheezing throughout the anterior and posterior chest. A few sibilant rales could be heard on the left side posteriorly. Heart was negative. Blood pressure was 120/60.

He was given the protein sensitivity tests intradermally and was found to be extremely skin sensitive to many inhalant and food allergens. A .01 Mg.N. timothy test resulted in a moderate to a marked reaction. The test with stock dust also resulted in a marked reaction. To animal epithelia the reaction was generally from moderate to marked. Testing with bakery sweeps gave a marked + reaction, and with kapok it was marked. The results to tests with food allergens were similarly marked, such as marked + to rice, corn and beef,, and the reactions to certain fresh vegetables and fruits were about equally severe.

Course of Treatment: The first measure in treatment was the directions for avoidance of contact with the irritant inhalant allergens, the most important precaution being removal from his present occupation. He had to cease working in the bakery. He was forbidden the ingestion of the foods to which he had been found sensitive, and he was desensitized against timothy pollen and stock dust.

Another factor which contributed largely to his recovery was that the patient adhered strictly to all regulations prescribed. He cooperated in every way. When he was told that he must give up working in a bakery, he did so even though he could not obtain another job and was in dire need of remuneration from his employment. Moreover, according to instructions, he carefully avoided taking any irritant food and was able to overcome his craving for those which he had

previously relished. In the course of treatment many complications arose which might reasonably have led the patient to deviate from his loyal spirit of cooperation. One serious instance especially occurred which almost cost his life.

As a result of an intradermal test with mustard of .01 Mg.N. strength, he suffered a constitutional reaction bordering on fatality. For three hours I worked over him in an effort to control the reaction, and then took him in a taxi to his home in Brooklyn. On the way a tourniquet had to be applied to his arm above the test area and adrenalin was given to him subcutaneously, as well as aromatic spirits of ammomia being administered orally and as an inhalation, because of choking seizure and his inability to breathe, together with the other usual manifestations that accompany a constitutional reaction. Two weeks after the occurrence of this event he returned in good spirits and ready to continue with the treatments.

From that time on his improvement was spectacular. The attacks of asthma ceased; the rhinorrhea, sneezing and coughing stopped. He was able to breathe, and felt like a new man. He continued to follow the prescribed diet, avoiding the ingestion of intolerant foods and contact with irritant inhalants, although he ventured to experiment with himself clinically. On various occasions he partook of forbidden foods and tried working at the bakery shop one or two days a week, resulting in the marked return of the asthmatic seizures, severe rhinorrhea and sneezing. Once convinced, by the trial method, of the ill-effects produced by not observing the prescribed rules he made no further attempt at experimenting, but followed the advice and regulations given. Subsequently he secured a job in a laundry and avoided even the proximity of a bakery.

Previous to the onset of the summer of 1931, and during that summer he was actively and thoroughly desensitized against timothy pollen. That summer he had no symptoms of hay fever whatsoever.

At the end of the summer, however, near the last of September, 1931, there was an unexpected return of allergic symptoms referable to the nose, rather severe in nature, such as rhinitis and marked sneezing. There were also slight

wheezing and marked dyspnea. Notwithstanding the recurrence, the patient showed no signs of discouragement. At this time I was at a loss to account for and to interpret the cause of the postseasonal exacerbation process. I was certain that he was adhering to the diet prescribed and he was continuing avoidance of irritant inhalants. At first I was inclined to suspect that overtreatment with dust extract may have produced this exacerbation. Consequently, I cut down on the treatment and later completely discontinued it. But still there was no improvement.

When I had given the case closer study, my suspicions were directed toward the possibility of a flareup of an old focus of infection in the upper respiratory tract, or perhaps a superimposed infection in that region and of recent origin. My suspicions proved correct regarding the presence of such a condition. The patient was referred to a hospital devoted to otolaryngology, where the advice concerning a tonsillectomy was promptly followed. It was also necessary to treat a pathologic nasal condition surgically. Within a period of from four to six weeks both operative procedures were instituted.

The patient remained free from any symptoms for four months. He was in excellent health throughout this period of time and it was believed his asthma and hay fever were apparently completely arrested. In February, 1932, however, he returned complaining of *frequent marked* wheezing and dyspnea. Again the suspicion was an infective state, probably a reinfection. A thorough rhinologic examination was made at this time and the following report submitted by Dr. Wm. Spielberg:

The nasal cavities are somewhat enlarged and filled with a small amount of mucopurulent secretion, mostly on the floor and dripping posteriorly into the pharynx. Postoperative partial submucous resection of the septum and resection of the anterior half of the right inferior turbinate bone are evident. The posterior tip of the latter appears hypertrophic, somewhat polypoid and covered with purulent secretion. The left posterior tip of the inferior turbinate shows evidence of having been resected. The mucosa of the middle turbinate appears granular, somewhat atrophic and covered with dry

mucopus and crusts more on the right side than the left. There are evidences of a bilateral low-grade, ethmoidal sup-puration.

Throat: Tonsils have been removed. The pharynx is dry and covered with a film of mucopus. Laryngeal examination is negative.

Radiographs: Views taken in the occipital, frontal, lateral and Rhee positions show a diffuse hyperplastic involvement of all sinuses, particularly the antra and the right ethmoidal labyrinth. A moderate veiling of the frontals is present. The sphenoids appear least involved.

In the opinion of the rhinologist the condition demanded the institution of proper drainage by surgical procedure. The patient agreed to cooperate further for the purpose of clearing up the upper respiratory infection. The patient was admitted to the Beth Israel Hospital where Dr. Speilberg performed a radical pansinus operation. The report of the pathological findings and part of the operative procedure in this operation is appended herewith:

J. B., age 44 years. Admission No. 48049. *Preoperative Diagnosis:* Asthma chronic suppurative pansinusitis polypoid type.

Postoperative Diagnosis: Asthma, chronic, suppurative pansinusitis polypoid and atrophic type.

Pathological Findings: Moderately advanced and low grade degenerative and polypoid changes of the mucosa lining the ethmoid labyrinth, particularly the posterior and preturbinal cells. Extensive bone resorption involving intercellular ethmoid septa in anterior ethmoid region and those in the vicinity of the nasofrontal duct. Atrophy with cystic and polypoid changes of both middle turbinates, particularly the right, which has been resected in part at a previous operation. Marked hypertrophy of the m.m. of the nasal surface of the ethmoid and sphenoid wall.

The septum was found to have been previously resected. Antra were free from residual pus. Pus was found in posterior ethmoids. Extensive polyposis was found of mucous membrane lining the antral surface of the entire nasal wall bilaterally.

Operative Procedure: A radical bilateral ethmoidectomy was done by completely resecting all ethmoidal cells, anterior, posterior and preturbinal, including agger nasi cells. Posteriorly, the ethmosphenoidal wall was resected to include the greater portion of the anterior sphenoidal wall. Extending the resection anteriorly through the anterior ethmoid cells and bulla the frontal sinus was entered through the infundibulum and all cells and polypoid tissue resected. The opening into the frontal was subsequently enlarged with frontal sinus rasps resecting a large opening through the floor to admit a No. 4 sinus sound. All debris, polypi, loose bone was then removed by blunt punches and curettes.

A resection was then done of the posterior two-thirds of the middle meatal wall, thus obliterating the upper inner angle of the antrum and allowing a free resection of what remained of the floor of the ethmoid labyrinth. This region was found extensively diseased and polypoid.

A complete resection of the inframeatal wall was then performed with leveling of the medial wall to bring the antrum and floor of the nose together. By resection of both the middle and inferior meati, most excellent drainage and ventilation was thus established.

Due to the pathologic condition of the middle turbinates, they were completely resected at the end of the operation, having served previously as a guide against injury to the anterior cranial fossa and cribriform plate.

The patient is now free from symptoms and has remained free for two years.

COMMENT.

I believe that the good results obtained in this case were due, first, to proper diagnosis and localization of etiologic factors; secondly, and most important, indeed, to the close cooperation on the part of the patient. It is seldom that the allergist meets with patients able and willing to carry out all directions. Such instructions are usually rather manifold and sometimes complicated and burdensome, so that very often the patient will refuse to follow them implicitly. With any omission or failure on his part, the progressive sequence is interfered with and success is postponed. For instance, if the patient in this case had followed every direction pre-

scribed except to give up his work in the bakery, the results would certainly have been unsatisfactory; had he given up his work in the bakery and adhered to the many instructions except to the strict avoidance of irritant foods in the diet, and of contact with certain inhalants other than irritants having their source in the bakery, the results would also not have been so gratifying; finally, if all the prescribed regulations had been followed but with a refusal to undergo tonsillectomy and the operation on the nose, and then the radical sinus operation, a return of symptoms would have been unavoidable and would have become continuous.

The case described represents definitely one of skin sensitivity to many allergens, yet there was also present a final stage, in the form of infective asthma. In his recent noteworthy contribution, Cooke¹ states, "No one now doubts that bacterial infection of the respiratory tracts causes asthma of an acute and paroxysmal as well as of a chronic form," and he goes on to prove conclusively that this infective asthma is as much of an allergic nature as of the skin sensitive type. One is therefore dealing with a case of asthma and hay fever of exquisite skin sensitivity to many allergens, the final stage being that of infective asthma, a complete allergic picture.

As regards the constitutional reaction from an intradermal test with mustard, there was nothing in the history obtained from the patient to suggest that a test with mustard should tend to result in a severe reaction. Hence, the test was made with an extract of .01 strength. I do not think it was the amount of mustard protein *per se* that produced the constitutional reaction in this patient, for Lamson,² in referring to Cooke's case of a fatal result from an injection of as small an amount as .002 mg. of nitrogen of liquid glue extract in the form of an intradermal test, expresses doubt whether it was really a true anaphylactic reaction. In his conclusive remarks, Lamson gives as his opinion that it is the nature of the injected substance which could have played a significant part in the fatal result and he is inclined to assume individual physiologic peculiarities on the part of the patient as the determining factor. I do not, however, wish to give the impression that higher dilutions for skin testing are not preferable. I thus agree with Fineman³ that the degree of hypersensitiveness to various atopens is determined by, and

is the result of, the strength of the atopens in the solution used for testing. Consequently, the use of higher dilutions certainly helps to avert alarm in a constitutional reaction.

Very little has been added to our present knowledge of constitutional reactions from various allergens since Cooke's⁴ original contribution to the subject. In his discussion concerning the danger of the diagnostic cutaneous tests for certain allergens with the use of concentrated solution extracts, and the danger that may result from the therapeutic injection of certain allergens, he gives a complete list of substances known to produce constitutional reactions. Among those given is mustard. In one of Cooke's cases (No. 2708), following an intradermal test with mustard an immediate reaction resulted, giving symptoms of severe asthma. My search of the literature has revealed no report or mention of a constitutional reaction to mustard of the degree here described.

CONCLUSION.

An allergic condition may pass through various stages. 1. There may be a stage of pollen sensitivity manifesting itself in seasonal hay fever or asthma or both. 2. Associated with this, or independently, there may develop a sensitivity to inhalants other than pollen, such as dust, orris root, or animal epithelia, and a sensitivity to certain foods. This sensitivity may manifest itself in the form of severe asthma or urticaria or other allied conditions. 3. On the other hand, a stage of asthma may occur and be due solely to a focus of infection in the upper respiratory tract. This is termed infective asthma. This focus may be of long standing and may have flared up because of a lowered state of resistance, or there may be a focus of infection superimposed upon the preexisting allergic state. According to Piness and Miller,⁵ Selfridge,⁶ Todd,⁷ and others, in subjects clinically considered allergic, infection in the respiratory tract is usually a disease superimposed on an already existing allergic condition; that is, infection is secondary to the allergic condition.

Suffice it to say, each stage above described must be handled in a particular way, according to circumstances, if the results gained are to be 100 per cent successful. More than that, however, and of utmost importance is the ability to recognize each stage at the proper time.

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235 East 22nd Street.

THE AMERICAN BOARD OF OTOLARYNGOLOGY.

An examination was held in Chicago, Sept. 8, 1934, during the meeting of the American Academy of Ophthalmology and Otolaryngology. Sixty-two candidates were examined, of which number, 13 were conditioned or failed.

The Board will hold an examination in San Antonio, Tex., Nov. 13, during the meeting of the Southern Medical Association. During 1935, examinations will be held in New York, in the spring, at the time of the meeting of the American Medical Association, and in Cincinnati, in the fall, just prior to the meeting of the American Academy of Ophthalmology and Otolaryngology. Prospective applicants for certificate should address the Secretary, Dr. W. P. Wherry, 1500 Medical Arts building, Omaha, Neb., for application blanks.

FURTHER OBSERVATIONS ON A CASE OF
PLASMACYTOMA OF NASAL CAVITY:
CASE OF NASAL PLASMACYTOMA
AND CARCINOMA OF STOMACH.
DR. HARRY ROSENWASSER, New York.

In 1930, before the Section of Laryngology of the New York Academy of Medicine, I presented a case of plasmacytoma of the nasal cavity. It was felt after careful study of the tumor, that our case suggested that plasmacytoma of the nasal cavity, was a tumor formed exclusively of lymphoblasts and lymphoblastic plasma cells—in other words, a lymphoblastoma with more or less extensive cellular transformation. Thus the plasmacytoma must be placed in a category close to lymphosarcoma of the nasal mucosa.

Because plasmacytoma according to reports in the literature generally recurred when removed surgically, and because it was regarded as a radiosensitive type of tumor, radon seeds were implanted, in our case, into the tumor mass, and after ten days were removed. This was followed by a course of deep X-ray therapy; the neoplasm definitely decreased in size and the nasal obstruction was relieved.

Two months later the patient was seen by me again and a specimen from the site of the tumor was removed, but histological examination was negative. We felt that the plasmacytoma had disappeared following radiation; however, the patient was kept under close observation.

On Sept. 16, 1930, eight months after this case was reported,¹ the patient was admitted, for the third time, to the Laryngological Service of the late Dr. Yankauer because of numerous small nasal hemorrhages from the left side of his nose. Ever since his original discharge the patient had been receiving radiotherapy in our Out-patient Department, where he was under the direct observation of Dr. W. Harris. There were no other complaints, no loss of weight. There was, however, definite local evidence of involvement of the left antrum

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and ethmoids. Operation was deemed advisable and a Caldwell-Luc operation was performed; at this time radium was inserted directly into the antrum and floor of the nose. Examination of the excised tumor tissue at this time was reported plasmacytoma. When the reaction from this procedure subsided the patient was referred to the Radiotherapy Department for treatment. The bleeding from the nose stopped, and again the patient's nasal obstruction was diminished.

On Nov. 25, 1930, there was local evidence of a recurrence and the patient was re-admitted to the hospital. At this time a widespread resection with the electrocautery was performed. Following this he was referred to our follow-up clinic and to the Radiotherapy Department.

On June 16, 1931, two years after the original treatment, the patient was readmitted for the fifth time, complaining of occasional nasal bleeding and of extruding small necrotic pieces of tissue from his nose and nasopharynx. The Caldwell-Luc operation was again revised, this time by Dr. R. Kramer, and as much of the tumor tissue and of the lateral nasal wall were removed as was possible. The specimen from the antrum showed chronic and acute inflammation; that from the septum showed plasmacytoma (lymphoblastic), with more numerous mitotic figures and more irregularity of the tumor cells than were noted in the previous specimen. Following this the patient was referred to the Nose and Throat Out-patient Department for convalescent care before radiotherapy was instituted again.

One year later, 1932, almost three years since the original treatment was begun, the patient was seen in the follow-up clinic. There was no sign of recurrence of the plasmacytoma in the nose, nasopharynx or regional lymph nodes. He had completed another course of 15 deep X-ray treatments and was apparently symptom free as regards his nose. It was noted, however, that he was losing weight. When first seen in 1929, he weighed 200 lbs., while at this time he weighed 161 lbs., and was complaining of "gas" and abdominal discomfort. Palpation of the abdomen was negative. Nevertheless, a gastrointestinal X-ray series was taken and a huge mass was found occupying the entire mesial half of the fundus and cardia of the stomach, and also involving the lower end of the esophagus. His general condition became steadily worse

and he was admitted to the Montefiore Hospital, where he continued to go downhill, dying of cachexia with terminal bilateral bronchopneumonia.

A complete autopsy was performed and the findings were carcinoma of the stomach with metastasis to the liver, pancreas, pleura and regional lymph nodes, bilateral bronchopneumonia, pulmonary emphysema, hypertrophy and dilatation of the right auricle and ventricle, mild bronchiectasis, healed apical tuberculosis, indeterminate endocarditis of the aortic valve, postoperative ethmoidectomy for plasmacytoma of nasal cavity and arteriosclerosis. There was no evidence of any recurrence of the plasmacytoma.

Comment: This patient with a plasmacytoma of the nasal cavity was carefully followed for over three years. From the clinical course of this case it is obvious that plasmacytoma, though it does not metastasize or involve the regional lymph nodes, is very difficult to eradicate surgically. The optimum results were obtained in our case with the use of surgery and radiotherapy. The patient died of a carcinoma of the stomach with metastasis. There was no evidence of recurrence of the plasmacytoma at the autopsy.

It is rather unusual to note the presence of two separate and distinct neoplasms, one a locally malignant radiosensitive type of tumor which had finally yielded to the combined therapy and the other a highly anaplastic carcinoma which ultimately caused the death of the patient.

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49 East 96th Street.

NUPERCAINE AS A LOCAL ANESTHETIC IN RHINO-LARYNGOLOGY.

DR. EDWARD F. EGAN, Brooklyn.

Until recently, following the practice of most laryngologists in surgery of the nose and throat, we have employed cocaine hydrochloride for topical and procaine hydrochloride for infiltration anesthesia. It is generally accepted that cocaine, although a most efficient anesthetic, possesses a rather high degree of toxicity and, further, that its use entails the danger of habit formation; consequently, one would welcome the introduction of a drug which, having the anesthetic activity of cocaine, would be free from the objectionable features mentioned; or, at least, would have them to a lesser extent. A substitute for procaine in infiltration anesthesia is less urgently needed; procaine is an effective anesthetic after injection and seldom gives rise to intoxication; nevertheless, the occasional catastrophe after the injection of even very small amounts of procaine shows that this drug does not constitute the ideal local anesthetic. Being moved by such considerations as these, the reports on a new local anesthetic, nupercaine, especially as utilized in rhinolaryngology, led us to try it experimentally in the series of cases forming the basis for this paper.

Chemically, nupercaine differs from cocaine and procaine, being the hydrochloride of alfabutyloxyinchoninic acid diethylethylenediamide. It is readily soluble in water and its solutions may be autoclaved in the customary manner. Even slight alkalinity, however, will cause the separation of the insoluble base; in preparing the solutions, therefore, it is better to use distilled water (which is usually slightly acid from the dissolved carbon dioxide) and chemically pure sodium chloride. If the solutions are to be kept for any length of time, nonsoluble glass containers should be used. If these precautions cannot be taken and a precipitate appears, the addition of diluted hydrochloric acid cautiously will cause this to disappear. Care should be taken not to add an excess

of the acid; a small drop will usually be sufficient for 100 cc. of the solution; too much acid will cause the solution to be irritant. Nupercaine causes an initial vasodilation, either when applied topically or after injection; this may be partly prevented by the addition of epinephrine.

It can scarcely be hoped ever to obtain a really effective local anesthetic that is absolutely nontoxic; nevertheless, an acceptable substitute for cocaine or procaine must be less likely than these drugs to give rise to poisoning when used in anesthetic concentrations. By animal experiments, attempts have been made to determine the toxicity of nupercaine, as will be shown in the following brief review.

Uhlmann,²⁰ using guinea-pigs and rabbits, concludes that nupercaine is five times more toxic than cocaine, but at least ten times more actively anesthetic; consequently, that nupercaine, in anesthetic concentration, is only one-half as poisonous as cocaine. Lipschitz and Laubender²² find that nupercaine has only about double the toxicity of cocaine and is from three times to one hundred times more active as an anesthetic, depending on whether the sciatic nerve of the frog or the cornea of the rabbit is used for making the comparison. Bond and Bloom⁴ state that, injected intravenously into dogs, nupercaine is five times more toxic than cocaine, but that when the drugs are injected subcutaneously into these animals, the toxicity is approximately the same. Gessner and Nauheimer¹³ report that nupercaine is anywhere from eight to 50 times more poisonous than procaine (not cocaine), depending on the species of animal used in the experiments. By the intradermal wheal test they estimate the anesthetic activity of nupercaine is 20 times greater than that of procaine. MacDonald and Israels²⁵ find that nupercaine is 23 times more toxic than procaine for guinea-pigs after subcutaneous injection (in marked contrast to the results of Gessner and Nauheimer), but that when the two drugs are compared by slow intravenous injection into cats until the respiration fails, the former is only 12 times more toxic than the latter. By the wheal test, they find nupercaine to be 20 times more actively anesthetic than procaine.

Fortunately, one does not have to depend solely on the results of animal experiments for information regarding the

efficacy, safety, or toxicity of nupercaine; so great has been the interest in this new drug that no less than 500 clinical reports have appeared since its introduction. Because of the large number of papers and also because a majority of them are concerned with the use of nupercaine in general surgery or in special fields where conditions are quite different from those existing in rhinolaryngology, no attempt will be made to review the clinical reports, except those of a rhinolaryngological nature.

Hirsch¹⁶ used 2 per cent solution of nupercaine, with the addition of 2 to 4 drops of suprarenin solution to the cubic centimeter, for topical anesthesia in the nose and throat. He states that 1 per cent nupercaine with 0.5 per cent phenol was equally as effective as the 2 per cent nupercaine alone and that either of these solutions caused anesthesia as satisfactory as that following application of cocaine hydrochloride in 10 to 20 per cent concentration. No untoward results were observed and the author was impressed by the long duration of nupercaine anesthesia. Rosenstein's³² report likewise deals with the use of 2 per cent nupercaine solution for topical anesthesia. The author is much pleased with the action of the drug in this strength, stating that tonsillectomies could be painlessly performed after its topical application. He mentions that nupercaine may be used in 1:2000 to 1:1000 for infiltration, but apparently did not employ it for this purpose himself. The experience of Zeidler³³ is somewhat unique. This author commenced with the employment of 20 per cent nupercaine, which was diluted with two parts of 1:1000 epinephrine solution. Such a concentration of nupercaine (6.66 per cent) gave, as might be expected, perfect anesthesia on topical application; as did 10 per cent nupercaine plus two parts of 1:1000 epinephrine. However, even in this latter concentration, local irritation was evident, as was the case after the use of 5 per cent, 3 per cent, and, finally, as dilute solution as one part of 2 per cent nupercaine and two parts of 1:1000 epinephrine. On the contrary, it was found that one part of 1.5 per cent nupercaine and three parts of 1:1000 epinephrine gave most satisfactory surface anesthesia and caused no irritation. Even with the strongest solution, no systemic intoxication was observed in any of his patients. Ruedi³³ employed 2 per cent nupercaine, with epinephrine addition, as surface anesthetic with satisfaction for procedures in the upper air passages;

however, this solution did not abolish the cough reflex when used in the larynx. For anesthesia prior to tonsillectomy in 33 cases, 1:1000 nupercaine (with epinephrine) was injected on one side and 0.5 per cent procaine hydrochloride (with epinephrine) on the other. No difference could be noted as to the quality of anesthesia on the two sides at time of operation, but freedom from discomfort persisted considerably longer on the nupercaine side. Schilling³⁴ briefly presents a favorable report on the use of 1.5 to 2 per cent nupercaine for topical anesthesia and of 1:2000 solution for infiltration. He comments on the entire absence of toxic symptoms in a series of 400 to 500 patients. Popper²⁸ likewise has found nupercaine in 2 per cent solution a very satisfactory anesthetic for topical application in the nose. He mentions the use of small amounts of 10 per cent solution, applied to the immediate vicinity of the sphenopalatine ganglion; apparently, without local irritation. Canuyt⁷ used 1 per cent nupercaine for topical and 1:1000 nupercaine for infiltration. His anesthesia was good and he observed no intoxication. Albesheim¹ found 2 per cent nupercaine equivalent to 10 to 15 per cent cocaine hydrochloride topically. No evidences of intoxication were observed in a series of 300 cases. Baer² found that nupercaine alone was capable of replacing cocaine as a surface anesthetic in rhinolaryngology. The author uses 2 to 3 per cent solution of nupercaine and has not observed any signs of intoxication. Von Lieberman³⁷ has used nupercaine in 2 per cent strength for topical anesthesia and 1:1000 for infiltration. He noted one case where, after painting with 2 per cent and infiltrating with about 20 cc. of 1:1000 solution of nupercaine prior to tonsillectomy, alarming symptoms of collapse set in and persisted for some little time. He states, however, that the patient was of a hysterical type. Richter³⁰ expresses complete satisfaction with the surface anesthesia obtained by use of 2 per cent solution of nupercaine, finding this fully equal to that following application of 10 per cent hydrochloride. Neither systemic nor local reaction of an undesirable nature was noted. Klestadt²⁰ obtained satisfactory surface anesthesia in some cases with 1 per cent nupercaine; he prefers, however, 1.5 per cent. In three cases he used nupercaine plus cocaine for surface anesthesia in the nose and observed rather severe collapse symptoms. Meyer²⁶ has used 2 per cent solution of nupercaine in 110 cases for sur-

face anesthesia and uniformly obtained good results. No evidence of local irritation or systemic intoxication was observed.

Prévo²⁹ uses 2 per cent nupercaine for topical application in the nose, 1:5 per cent for use in the larynx. The anesthesia was most satisfactory. For infiltration, he has employed 1:1000 and even 1:500 nupercaine, commenting on the long duration of anesthesia. No cases of intoxication were observed. Mounier-Kuhn²⁷ finds that 1 per cent solution of nupercaine affords insufficient anesthesia of mucous membranes of the nose and throat for most operative procedures; it is necessary to use 2 per cent, which is most satisfactory. For infiltration, he used 1:500 solution. During eight months' observation, no instances of intoxication were encountered. Sonnenschein²⁵ uses 2 per cent nupercaine for topical anesthesia, which is most satisfactory. He noted one case of mild intoxication, following the local application of a mixture of nupercaine and alpine, believing this to be due to a potentiation from mixture of the two drugs. Slight irritation has been observed in a few cases, but the local damage is less than that produced by cocaine. DeGroot⁸ finds that 2 per cent nupercaine solution gives excellent surface anesthesia in the nose and throat. For infiltration, he used 1:1000 concentration. He mentions one instance of successful anesthetization for tonsillectomy following only topical application of the 2 per cent solution. For surface anesthesia, Fuchs¹¹ used 1 per cent solution of nupercaine with unusually high concentration of epinephrine, stating that his anesthesia was quite satisfactory. For infiltration also, very dilute solutions were used by this author, 1:4000 to 1:2000. When employed prior to tonsillectomies, no epinephrine was added. Freystadt¹⁰ concludes that cocaine may be entirely replaced by nupercaine for surface anesthesia, the latter drug being about eight times more active than the former. For infiltration and conduction anesthesia, nupercaine is to be preferred to procaine when unusually long anesthesia is desired. Calabresi⁶ uses 2 per cent nupercaine for topical anesthesia and 1:1000 for infiltration. His series comprises over 300 cases; anesthesia has been good invariably and no intoxication has been observed. Jelinek¹⁸ at first tried 10 per cent, then 5 per cent nupercaine topically, but noted local irritation; subsequently, he resorted to a mixture of 2 per cent nupercaine, one part, and 1:1000 epinephrine, three parts. This latter

solution (containing only 0.5 per cent nupercaine) was found to be satisfactory for topical anesthesia in the nose and throat, being equal to 10 per cent cocaine hydrochloride.

In all of the above reports the anesthesia was stated to be quite good and if signs of intoxication appeared, they were slight and, possibly, of a psychic nature. Martins,²⁴ however, reports a fatality which he ascribed to the action of nupercaine applied topically in the nose. The history of this case is as follows: Septum operation was planned for a very nervous patient. About 3 cc. of 1 per cent nupercaine (with an unstated amount of epinephrine) were sprayed into the nose. After ten minutes, about 30 cc. of 0.5 per cent procaine hydrochloride injected under the perichondrium, the solution containing five drops of 1:1000 epinephrine. After this, tampons saturated with a 20 per cent solution of alpine plus epinephrine were introduced. As patient seated himself on operating stool, clonic convulsions of the arms and legs occurred and patient fell to the floor unconscious. Camphorated oil was injected and pulse improved; convulsions recurred and the pulse was no longer palpable. Hexeton, 1 cc. injected intravenously. All this time the alpine-saturated tampons had been allowed to remain in place; they were now removed. Death soon occurred.

It is difficult to see why the poisoning in this case should have been ascribed to nupercaine. The injection of such an excessive amount of procaine hydrochloride for an operation of the nature planned, and employment of tampons, *saturated with 20 per cent alpine* were, doubtless, responsible; not the small amount of nupercaine.

Luscher²³ reports an instance of reaction following topical application of 2 per cent nupercaine with epinephrine in a patient with "unstable vascular system"; recovery followed administration of hot coffee. The possible role of epinephrine must be considered.

In a review by Hirschfelder and Bieter,¹⁷ mention is made of a fatality after injection of 15 cc. of 1 per cent nupercaine prior to tonsillectomy. Of course, the employment of a solution as strong as 1 per cent for infiltration is absolutely contraindicated, not only because of the danger of systemic intoxication, but also because local damage would probably result.

The dosage here is at least ten times that necessary for effective anesthesia.

Few papers have appeared on the use of nupercaine in America. Keyes and McLellan¹⁰ have reported their results with this drug for caudal and spinal anesthesia; Romberger²¹ its employment in conjunction with procaine for spinal anesthesia, and Butler⁵ its use in spinal anesthesia. Laszlo²¹ has discussed nupercaine at length as a local anesthetic in this particular field, concluding that the drug is quite valuable for topical anesthesia where shrinkage is not desired, but that it seems to offer no especial advantage over procaine for infiltration. In a considerable series of cases he noted neither local nor systemic reaction of an undesirable nature. Gatewood¹² reported the results of quite extensive observations. He concludes that 2½ per cent nupercaine solution is most satisfactory for surface anesthesia and should entirely replace cocaine. For infiltration, he employed nupercaine in 1:1000 concentration, finding it highly satisfactory. Nupercaine has been given incidental mention of a favorable nature by Beck,³ Guttman,¹⁵ Cohen⁸ and Gross.¹⁴

PERSONAL OBSERVATIONS.

Our own series of cases is quite limited; however, we feel that certain conclusions are justified. Nupercaine has been used for surface anesthesia alone in four polypectomies; for topical and infiltration anesthesia in 24 cases of submucous resection, and for infiltration alone in 19 tonsillectomies.

A few preliminary observations led us to the conclusion that 2 per cent solution of nupercaine was unsatisfactory for routine use as a surface anesthetic in the nose or throat because of the delay in the onset of anesthesia after application; because of this, we adopted 2.5 per cent solution. It may be said at the onset that this stronger solution has caused no signs of local irritation nor has its employment been followed by any evidence of systemic intoxication. Ten drops of 1:1000 solution of epinephrine hydrochloride were added to each ounce of the anesthetic solution after the latter had been sterilized and allowed to cool.

The technic used to obtain anesthesia prior to polypectomy was as follows: Cotton-tipped applicators were saturated with

the 2.5 per cent solution and four to six applications made to the mucosa. Following this, nupercaine-saturated applicators were placed under the middle turbinates to anesthetize the sphenopalatine ganglion and high up in the nose to block the nasociliary nerve.

In the cases of submucous resection, the same procedure was followed, but after establishment of surface anesthesia, tampons, saturated with 1:1000 solution of epinephrine hydrochloride, were inserted in each side for five minutes. After removal of the tampons, 1:1000 solution of nupercaine, containing ten drops of 1:1000 solution of epinephrine to the ounce, was injected along the proposed line of incision, about 2 cc. of the solution being used.

In the four polypectomies, topical application of 2.5 per cent solution of nupercaine, containing epinephrine, produced quite satisfactory anesthesia with no untoward results, either locally or systemically. The onset of anesthesia was definitely delayed, as compared to that resulting from application of 10 per cent solution of cocaine hydrochloride, the shortest period being 25 minutes and the longest 35 before establishment of complete anesthesia. An attempt was made to determine roughly the duration of anesthesia by having the patients signal the nurse when sensation apparently returned to the nose or throat. As well as could be judged by this method, the shortest duration of anesthesia was 2 hours and 15 minutes; the longest, 3 hours, and the average, 2 hours and 45 minutes.

In the 24 instances of submucous resection, also the anesthesia was quite satisfactory as regards intensity and duration. In spite of the addition of epinephrine in the amount stated, the first effect of nupercaine in our cases, either after topical application or injection, was to cause vasodilation. This vasodilation, of advantage when polypectomy is to be done, resulted, in a few cases, in rather annoying hemorrhage on making the first incision when submucous resection was to be performed. However, the initial vascular relaxation is soon followed by vasoconstriction and we have never observed postoperative bleeding of a serious nature here or in patients subjected to tonsillectomy under nupercaine infiltration anesthesia.

In the submucous resection patients, the earliest onset of anesthesia noted was 20 minutes; the latest, 45 minutes, and the average, 25 minutes. The shortest duration of anesthesia was 2 hours; the longest, 4 hours and 30 minutes, and the average, 3 hours and 10 minutes.

For infiltration anesthesia preceding tonsillectomy, 1:1000 solution of nupercaine, containing ten drops of epinephrine to the ounce, was used. The patients were given no pre-operative sedative medication of any kind. A 5 cc. Luer syringe was filled with the nupercaine solution and injection of approximately one-third of the contents made at each of the following points: high up in the tonsillar fossa; in the middle of the anterior pillar, behind the capsule; and low down, at the base of the tonsil. Occasionally, an injection was made high up in the posterior pillar. Only in exceptional cases was more than 5 cc. to the side used.

When injection was made properly, anesthesia was perfectly satisfactory in every instance. The quickest onset of anesthesia was ten minutes; the greatest delay was 20 minutes, and the average for onset of satisfactory anesthesia was 13 minutes.

Oozing at the time of operation seemed freer than after injection of procaine hydrochloride and epinephrine; however, as previously noted, no serious postoperative hemorrhage was encountered in our rather small series of cases. Healing took place promptly with no evidence of any unfavorable action on the tissues; no systemic toxic manifestations were observed, if one excepts those cases where the psychic element was, apparently, responsible for pallor, breathlessness or similar disturbances of a very transitory nature.

The duration of anesthesia in these cases subjected to tonsillectomy under nupercaine anesthesia appeared to be rather greater than after the injection of 1 per cent procaine hydrochloride. However, this greater duration of anesthesia was not so pronounced as we had been led to hope for from some of the previous reports. In our series, the shortest duration was 50 minutes; the longest, 2 hours and 35 minutes, and the average, 2 hours. We feel quite positive that the greater duration of anesthesia following the use of nupercaine may be of advantage in allowing complete hemostasis, the local insensitiveness tending to prevent the frequent clearing of the throat.

CONCLUSIONS.

1. As judged by a review of the literature and our own experience, nupercaine is of distinct value for inducing surface anesthesia in the nose and throat, and may be capable of completely replacing cocaine for this purpose.

2. For surface anesthesia, we have found it desirable to use 2.5 per cent solution of nupercaine, with ten drops of 1:1000 epinephrine to the ounce. With this solution, the onset of anesthesia is somewhat slower than after the application of 10 per cent cocaine hydrochloride.

3. The concentration of epinephrine employed by us is sufficient to overcome the initial vasodilation of nupercaine. This vasodilation may be desirable in some instances, undesirable in others.

4. In 1:1000 concentration, nupercaine appears to be a satisfactory anesthetic for infiltration prior to tonsillectomy. The duration of anesthesia produced by such a solution exceeds that from 1 per cent procaine hydrochloride. The superiority of nupercaine over procaine hydrochloride for routine use in infiltration has not been established by our results except as regards duration of anesthesia.

5. No evidence of local irritation, delayed healing or systemic intoxication was observed in any of our patients following the use of nupercaine, either topically or by infiltration.

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**TRACHEOFISTULIZATION FOR PULMONARY
CATHETERIZATION. AN ADDITIONAL
APPROACH FOR DIRECT INTRA-
PULMONARY THERAPY.***

DR. M. J. MANDELBAUM, New York.

This patient, a male of 58, a butcher, suffered from infancy with bronchopulmonary pathology, principally in the nature of severe asthmatoïd seizures with violent coughing paroxysms coming on at any time of day, but more frequently at night. In recent years the attacks became so severe as to incapacitate him so that he could not follow his occupation.

He had practically every kind of treatment; medicinal, allergic, roentgen, vaccinal, climatic and bronchoscopic. Examination revealed bilateral nasal polyposis of the ethmoids associated with rhinitis sicca and chronic hypertrophic nasopharyngitis.

Direct laryngoscopy and bronchoscopy disclosed numerous crusts on the vocal cords and on the tracheal walls, some crusts so thick that, when opposite each other, would touch on expiration. Some of these crusts extended into the lower right bronchus.

Bronchoscopic lavage failed to give the patient any relief owing to the frequent recurrence of the crusts between treatments.

It was then that tracheofistulization was decided upon, through which orifice more frequent treatments could be given per catheter.

Having been engaged for the past twelve years in research on the possibilities of direct intrapulmonary therapy by means of pulmonary catheters of the ureteral type, first upon ani-

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mals and then in humans, it was found that four routes were open for this procedure, namely:

1. Transnasal route. 2. Transoral route. 3. Transtracheal route. 4. Transthoracic (called by McDowell of Rio de Janeiro, the transparietal), route.

The simplest, most easily applicable, least disturbing to the patient, and most frequently used in the transoral route.



FIG. 1. The patient is seen sitting beside the bronchoclysis stand, from which is suspended the glass funnel containing the medication. To this is attached the rubber tubing upon which is a small regulating clamp, below which is the glass Murphy drip bulb. This in turn is connected to the ureteral catheter, which is seen entering the small tracheostomization orifice.

The transnasal route, suggested by Haslinger of Vienna, and recently used by Drs. Murphy and Potter of the Hudson County Tuberculosis Sanatorium of New Jersey, for the introduction of lipiodol, is the second choice.

The third route, the transtracheal, is applicable in the more serious cases where daily or even more frequent intrabron-

chial medication is necessary, or for prolonged application of isotonic, isothermic medication in aqueous solution which I termed "Bronchoclysis," or the bronchial drip.

Tracheofistulization is not new, having been suggested by Georges Rosenthal of Paris, about 1900.

You here note the minute opening in the midline of the neck leading to the trachea. It is scarcely more than 3 mm. in diameter, and the catheter, as you see, descends through this opening into the right lower bronchus, the location of his major pathology (see Fig. 1).

The armamentarium consists of a bronchoclysis stand from which the fluid medication reservoir is suspended. This is connected to a Murphy drip bulb by one-quarter inch pure gum tubing upon which is a flow control clamp. The distal end of the rubber tubing leading from the bulb is connected to the ureteral type of pulmonary catheter by a glass connecting tube or a metal adaptor.

A complete description of the method and technique was given when the apparatus was presented in September, 1932, before the American Congress of Physical Therapy and was subsequently published in the *Archives of Physical Therapy* in November, 1932.

The fistula in this case was produced by means of the Reverse Tracheotome which I first demonstrated before the Section on Laryngology, Rhinology and Otolaryngology of the American Medical Association at Washington, D. C., May 16-20, 1927, and which was published in *THE LARYNGOSCOPE*, November, 1927.

In all of my tracheofistulizations, the "tracheostomies" were performed under local anesthesia, a few drops of 1 per cent novocaine in the midline of the neck anteriorly between the second and third tracheal rings, preceded by the application of 10 per cent cocaine to each pyriform sinus, to block off the laryngeal nerves, as well as 1 ccm. of 2 per cent cocaine introduced into the trachea by syringe. The operation in two of these cases was performed in my office.

The fistula in this patient was made on October 29, 1932. At first he received direct intrapulmonary treatments every other day, which consisted mainly of the introduction of aque-

ous remedial agents by means of the bronchial drip through a ureteral type of bronchopulmonary catheter of radiopaque material.

This was introduced through the tracheal fistula into the lower end of the right lower main bronchus with the patient under the fluoroscope. That it was properly placed in the desired bronchus was ascertained by introducing a few drops of what I call the "finding solution," viz., 5 drops of lipiodol, injected through the catheter into the affected area which had previously been determined by preliminary roentgen study and bronchoscopic examination.

Under the fluoroscope the patient is turned slightly from side to side and the head raised or lowered as found necessary, the catheter being slightly withdrawn and reintroduced into the various bronchi in the region of the lesion. A few drops more of lipiodol is injected into each bronchial opening until the proper position is noted, when the distal end of the catheter is finally inserted and anchored there.

The remedial agent used in this case was mainly Meta-Synephrine, which I have found to have a remarkable antispasmodic effect in bronchospasm, or whatever cause, and particularly in cases of severe chronic bronchial asthma.

With his several acute bronchial exacerbations during the winter, several injections of 10 ccm. of Collosol Argentum (Crookes Laboratories, Incorporated) were made, which I have found to have a distinct advantage as a bronchial antiseptic.

The patient made a marked improvement and from a life of complete invalidism has been returned to an active, useful one. In another week I will remove the catheter and allow the fistula to close.

P. S.: Since this paper was read the catheter was removed, the fistula has completely healed, scarcely leaving any mark, and the patient has made a complete symptomatic cure.

27 West 72nd Street.

THE NEW YORK ACADEMY OF MEDICINE.

SECTION OF OTOLARYNGOLOGY.

April 18, 1934.

(Continued from September issue.)

DR. JOSEPH C. BECK: Thank you, gentlemen, for this liberal discussion I have enjoyed it and I have learned a good many things, as I always do when I hear you men frankly discussing the subject. Most of the men said that they agreed and then emphasized certain points which evidently were not stressed sufficiently in the paper.

In the first place, Dr. Hirsch spoke of doing an operation like the window resection of the thyroid cartilage for a case which we would consider was an indication for laryngeal resection. That is just like a laryngotomy and removal of the growth. We do not agree with that. I want to repeat a statement a radiologist recently made to me, that we laryngologists are moral cowards regarding their ability to cure cancer by either X-ray or radium. "All you give us are inoperable cases, when the cancer is spread throughout the neck and glands. Then you say, let the radiologist have it. What results can you expect? Give us some of the operable cases, those cases that are just right for laryngofissure." I think that would be a splendid attitude to take when they, the radium and X-ray therapists, have shown us just one case like that that has been treated by them and remains cured. There are institutions where such cases are being treated like that. I have two cases now at the Veterans' Hospital being treated by the radiotherapists, excellent cases for simple thyrotomy. We shall see after a time if they are actually what they call cured by radiation. I do not mean putting in radium seeds. I am speaking of therapy from a distance or radium pack. If I had a cancer of the larynx, what kind of treatment would I want? We laryngologists are willing to give up doing the operations if the radiotherapy will cure them.

Coutard, who set the medical world aflame, you might say, with his treatment, shows only 25 per cent of cures of cancer of the larynx. Of course, his classification is not only on the basis of cellular pathology; he does not use the classification of I, II, III and IV. It is based on much more refinement of the biologic elements of the cells. Of course, his method of treatment is being tried and tried very severely, in this country particularly. Everybody is very much in favor of it. You saw the results from what we have seen tonight shown by your local radiologists, not only from the Coutard method of radiation, but what other methods may accomplish. You must have very accurate control of everything pertaining to a case. The case should be watched by two or three men, not that a man intentionally would try to put something over, but he may be mistaken. This cancer topic is a very important subject and we must be sure of our facts.

I want to thank Dr. Imperatori for mentioning that Society that has to do with aphonia or loss of voice and its activities. During our exposition in Chicago last year, the World's Fair, there was a man shown, a patient of Dr. Lynch, of New Orleans. He had done a laryngectomy on him a number of years ago, I think four or five years ago. The man was cured of cancer of the larynx and learned to use his buccaloesophageal voice. Having been employed in a musical house for years, he knew something about the use of tones and the production of the voice. He was exhibited at the Fair in the exhibit of "Believe It or Not" of Mr. Ripley. He was demonstrated to the public as a man who could talk without a larynx. Of course, that made a

great hit with the public. I was very much pleased with this because the loss of voice is one of the great stumbling blocks as soon as you mention a laryngectomy.

I was anxious to hear some of the gentlemen discuss, and Dr. Loré did mention the subject of bilateral affections, especially of the anterior commissure. Chevalier Jackson suggests a section of the anterior part by an operation that he is the sponsor for. Dr. Tucker stated recently that he has had fair success with it. We are looking forward to the time element as to what this type of operation will show. We have not yet accepted that proposal and have removed the larynx whenever we had a condition of that kind existing. I had one case like that in which there were no palpable glands, but at operation a small prethyroid gland was found which was carcinomatous. We are not saying that it is necessary to have palpable glands when we say that there is an invasion or extension. Microscopic invasion is sufficient, and whenever the posterior part of the larynx is involved we feel that even though there may not be palpable glands or that examination of the esophagus or pharynx reveals nothing, these are the cases which are dangerous for laryngectomy and there is a good chance for recurrence. We have operated on such cases, but these cases have recurrences. We have subjected most of them to radiotherapy postoperatively and have seen most of them recur in spite of that treatment. We just have to tell the facts about it, and I am not trying to knock the radiologist. I am just hoping he will have greater success.

The general condition of the patient was mentioned, particularly the sugar proposition. Of course, all patients are subjected to thorough general examination, before operation, and if they have such a condition as that they will have to be treated. I can say without a doubt, if they are diabetic or potentially diabetic and have received adequate treatment, that the usual massive necrosis in and around the wound is lessened, but it still occurs. They are poorly healing subjects.

The electrically energized larynx interests me very much. I am sure Dr. Buckley will pardon me, but this is not entirely new to me. Dr. Guttman and I spent today the whole forenoon at the Bell Telephone Company because we were interested in such a proposition. Dr. Guttman spoke to the gentleman there who is in charge of this particular subject. He was very kind and he told us that we were a little late. He did not mention the name of the man who was assisting them in this work in New York. We had the same thought about such a larynx, but were just a little late. Anyway, he explained to us about this method of voice production. This production of a voice by the aid of an icepick is no fairy tale. It actually happened. The patient lives in Milwaukee and he certainly can speak with the aid of his method. However, it is a little too early to report on our experience in imitating him, but we thought we would put it on record.

Again I wish to thank you, Mr. Chairman, and you ladies and gentlemen, for your kind interest and reception.

DR. M. REFSE GUTTMAN: I have nothing to add except that I wish to thank the men who have discussed the paper for the very kind treatment which we received at their hands.

NASHVILLE ACADEMY OF OPHTHALMOLOGY AND OTO-LARYNGOLOGY.

Meeting of Feb. 19, 1934.

Dr. F. E. Hasty, Chairman, Presided.

Hemorrhagic Cyst of Sphenoid. Dr. Eugene Orr.

Mr. S. E. T., white, male, age 38 years, was admitted to St. Thomas Hospital, Aug. 14, 1932, because of a severe epistaxis on the right side. He gave a history of having had some bleeding the day before which was checked promptly. At the time of his admission the bleeding had been profuse for several hours. A packing was placed both anteriorly and postnasally which did not completely control the bleeding. There was a hemorrhage from the external auditory canal, an old perforation of the drum being the point of exit. The patient was transfused Aug. 5-6-7-8. The systolic blood pressure on admission was 130 mm. of mercury, which was reduced to 80 mm. of mercury; hemoglobin was reduced to 54 per cent; R.B.C. 19,500,000, Wassermann negative. The right external carotid was ligated under local anesthesia on the night of Aug. 8. Following this procedure there was no recurrence of the bleeding until Jan. 13, 1933.

At this time a hemorrhage was from the right nostril; no bleeding area was located. Believing that the hemorrhage was from the posterior part of the nose and probably due to malignancy or hemangioma, radium and electrocoagulation were used. The patient was again admitted to the hospital and the posterior two-thirds of the nasal septum was removed. As there was no hemorrhage after the operation, no bleeding point was located. The procedure instituted permitted better packing of the posterior nares. There was no further hemorrhage until Feb. 16, 1933.

Coagulation by diathermy was attempted, but was not successful. An extensive exploratory operation was done Feb. 19, 1933, under local anesthesia. The soft palate was bisected and an incision was made through the periosteum of the hard palate extending to the alveolar process. The mucoperiosteum of the hard palate was elevated and the bone was removed with Kerrison forceps from the posterior portion proceeding anteriorly. Two openings into the right sphenoid sinus were exposed, the ordinary ostium and an abnormally large one. The latter was probably an erosion located below the level of the normal one and the extreme lateral aspect of the sinus. After the packing was removed, which had been in place, a slight trickle of blood appeared from the larger opening. On enlarging the sphenoidal ostia there was exposed a polyp, or cyst, slight manipulation causing free hemorrhage. The anterior wall of the sphenoid having been removed, the tumor and lining membrane of the sinus were removed through the opening in the anterior wall. The cavity was packed with iodoform gauze and the palatal opening closed with mattress sutures. The laboratory reported a fibrous polyp with cystic and hemorrhagic changes. The wound healed except in one area approximately ten mm. long in the hard palate. He was fitted with a plate which closes the defect satisfactorily. An attempt to permanently close this had not been made at this time.

The patient has recurrent headaches of the vidian neuralgia type which is relieved by local application of cocaine to the sphenoid area.

